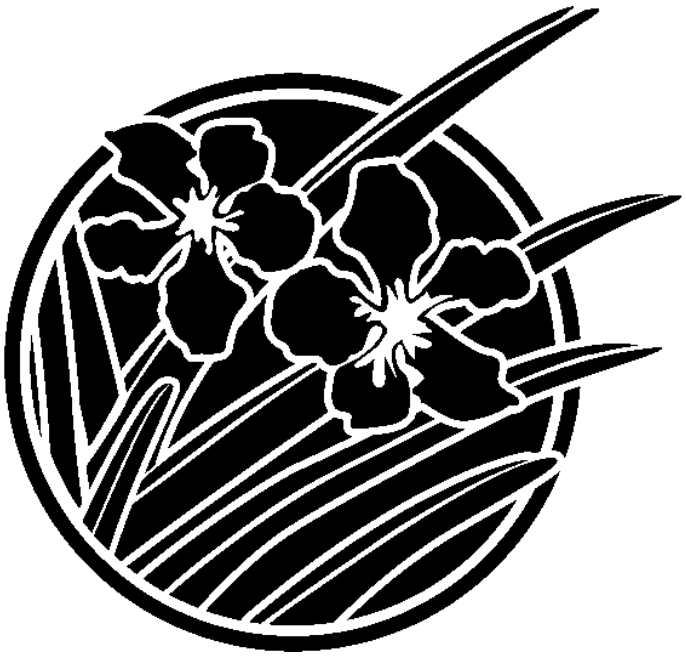

FOSTER BOTANICAL GARDEN
Master Plan

Prepared for:
City and County of Honolulu
Department of Design and Construction
Department of Parks and Recreation

Prepared by:
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813

March 2002

TABLE OF CONTENTS

ACKNOWLEDGEMENTS 1

INTRODUCTION 4

PURPOSE 4
PLANNING PROCESS 5

BACKGROUND INFORMATION 7

HONOLULU BOTANICAL GARDEN SYSTEM 7
FOSTER BOTANICAL GARDEN 8
History 10

SITE ANALYSIS 14

TOPOGRAPHY 14
GARDEN AREAS AND BOTANICAL COLLECTIONS 14
EXISTING FACILITIES 17
ENTRIES AND ACCESS 19
CIRCULATION 20
PARKING 21
UTILITIES 22
GREEN WASTE 22
GARDEN OPERATIONS 23
Administration and Staff 23
Volunteers 23
Visitor Counts and Information 23

MASTER PLAN FOR FOSTER BOTANICAL GARDEN 25

GOALS 25
IMPROVED STREET FRONTAGE AND VISIBILITY 26
VISITOR CENTER AND ADMINISTRATIVE OFFICES 29
Monkey Pod Entrance Courtyard 29
Architectural Design and Program 29
VISITOR PARKING AND RELOCATED MAIN ENTRANCE 34
LYON ORCHID CONSERVATORY AND GARDEN 36
GARDEN AREAS 36
New Garden Areas 37
Community Garden 40
SERVICE AREA AND MAINTENANCE FACILITIES 40
CIRCULATION 42

INTERPRETIVE PLAN, DISPLAYS, AND SIGNAGE 42
NOISE WALL AND BUFFER 42
PERIMETER FENCING 43
LIGHTING, IRRIGATION, AND UTILITIES 43
ACCESSIBILITY 44

IMPLEMENTATION 45

PHASING AND COST ESTIMATES 45
OTHER DESIGN ISSUES 46

REFERENCES AND SOURCES 49

APPENDIX A A-1

EXCEPTIONAL TREES A-1
SIGNIFICANT TREES A-4
MONUMENTS, SCULPTURES, AND MEMORIALS IN THE GARDEN A-7

APPENDIX B B-1

ISSUES, CONSTRAINTS, AND OPPORTUNITIES B-1
Public Entrance and Visibility B-1
Facilities and Maintenance B-1
Safety B-2
Circulation and Access B-2
OTHER ISSUES AND CONCERNS B-3

APPENDIX C C-1

DETAILED PHASING PLAN AND COST ESTIMATES C-1

LIST OF FIGURES

Figure 1: Map of the Honolulu Botanical Garden System 7
Figure 2: Location Map 9
Figure 3: Dr. Harold L. Lyon 12
Figure 4: Site Analysis 15
Figure 5: Existing Facilities and Significant Trees 16
Figure 6: Existing Visitor Entrance 19
Figure 7: Freeway Underpass near Nu'uanu Stream 21
Figure 8: Existing Irrigation Tap 22
Figure 9: The Historic Upper Terrace 25
Figure 10: Master Plan for Foster Botanical Garden 27
Figure 11: View of Foster Botanical Garden from the intersection of Vineyard Boulevard and Maunakea Street 28
Figure 12: Existing View of Foster Botanical Garden from the corner of Vineyard Boulevard and Nu'uanu Avenue 28
Figure 13: Conceptual Sketch of Proposed Left-Turn Lane on Vineyard Boulevard at Maunakea Street 35
Figure 14: Daibutsu Terrace 36
Figure 15: Black Pine Bonsai on Display at Elandan Garden in Bremerton, WA 38
Figure 16: Bonsai Display Garden Golden State Bonsai Federation Collection North at the Lake Merit Garden Center, Oakland, CA 38
Figure 17: View of Nu'uanu Stream Adjacent to Foster Botanical Garden 39
Figure 18: Construction Phasing Plan 48

LIST OF TABLES

Table 1: Existing Facilities and Space Usage 18
Table 2: Foster Botanical Garden Annual Visitor Counts, 1993-2001 24
Table 3: Proposed Architectural Program for the Visitor Center 30
Table 4: Proposed Space Requirements for Administrative Staff 33
Table 5: Proposed Architectural Program for the Service Area 41

ACKNOWLEDGEMENTS

The Foster Botanical Garden Master Plan is the culmination of months of research, planning, and meetings with individuals and organizations who share a love for the little piece of heaven in urban Honolulu, Foster Botanical Garden. *Mahalo nui loa* to all those who have participated in the development of the master plan. Your time, dedication, and *mana'o* have been invaluable.

City & County of Honolulu
Mayor Jeremy Harris
Benjamin Lee, Managing Director
Jon Yoshimura, City Council Chairman
Chris Ovitt, Council Chair Jon Yoshimura's Office

Rae M. Loui, Director, Department of Design and Construction
Eric Crispin, Assistant Director, Department of Design and Construction
Terry Hildebrand, Project Manager, Department of Design and Construction
Don Griffin, Department of Design and Construction

William D. Balfour, Jr., Director, Department of Parks and Recreation
Stanley Oka, Director of Urban Forestry
Heidi Bornhorst, Director of the Honolulu Botanical Gardens
Derrick Miyasaki, Superintendent, Honolulu Botanical Gardens
Joshlyn Sands, Arborist, Honolulu Botanical Gardens
Winnie Singeo, Botanist, Honolulu Botanical Gardens
Nathan Wong, Education Specialist, Honolulu Botanical Gardens
The entire staff and volunteers at Foster Botanical Garden

Neighborhood Boards
Lynne Matusow, Downtown Neighborhood Board
Kanoe Cazimero, Downtown Neighborhood Board
Teresa L. Russell, Liliha/Kapālama Neighborhood Board
Michelle Uyehara, Liliha/Kapālama Neighborhood Board
Kent Bennett, Liliha/Kapālama Neighborhood Board
Gary Higa, Liliha/Kapālama Neighborhood Board
Paula Kurashige, Nu'uanu/Punchbowl Neighborhood Board
Patt Spencer, Nu'uanu/Punchbowl Neighborhood Board
Bernadette Young, Kalihi/Pālama Neighborhood Board
Kenneth A. Akamine, Kalihi/Pālama Neighborhood Board

Community Members and Organizations

Friends of Honolulu Botanical Gardens (FHBG)
and the Foster Botanical Garden Master Plan Review Committee:
Paul Weissich, FHBG
Dana Ann Yee, FHBG
Robert Boom, FHBG
Grace Dixon, FHBG
Mary Jane Lee, FHBG
Jason Umemoto, FHBG

Lina Agbayani, Foster Community Gardeners
Chris Aguilnaldo, Landscape Industry Council of Hawaii
Carol A.S. Bebb, Foster Community Gardeners
Sean Casey, Youth for Environmental Service
Sybille Char, Foster Community Gardeners
Vhing Ching, Foster Community Gardeners
Marian Chun, Ikebana International
The late Ms. Betty Crocker, Scenic Hawai'i
Diana Doerr, Scenic Hawai'i
Leigh-Wai Doo, President, Dr. Sun Yat-Sen Hawaii Foundation
Rom Duran, Foster Community Gardeners
Doris Dutro, Foster Community Gardeners
Don Goo, Dr. Sun Yat-Sen Hawaii Foundation
Wayne Goo, Dr. Sun Yat-Sen Hawaii Foundation
Carol Hopkins, Scenic Hawai'i
Ron Kaneshiro, Hawai'i Bonsai Association
Barbara Kelly, Youth for Environmental Service
Ryan Kurashige, Hawai'i Bonsai Association
Tim Liu, Suiyobi Bonsai Club
Eleanor Locey, Keala Ho'onanea Condominium
Gregory Mark, Executive Director, Dr. Sun Yat-Sen Hawaii Foundation
Jean Marutani, President, Ikebana International
Ed Nakanishi, Hawai'i Bonsai Association
Julie Oba, Ikebana International
David Orr, Waimea Arboretum
Jackie Ralya, Kaulunani Urban Forestry Program
Barbara Schafer, Honolulu Orchid Society
Pat and Christie Silva, Foster Community Gardeners
Eleanor Souza, Foster Community Gardeners
Mary Steiner, The Outdoor Circle
Wayne Suzuki, Suiyobi Bonsai Club
Laura Thompson, Mālama Hawai'i
Bertha Tottori, Ikebana International

Teresa Trueman-Madriaga, Kaulunani Urban Forestry Program
Rosemarie Tucker, Foster Community Gardeners
Aulani Wilhelm, Mālama Hawai'i
Lucien Wong, Dr. Sun Yat-Sen Hawaii Foundation
Warren Yamamoto, Hawai'i Bonsai Association
Jane Yamashiroya, President, Hawai'i Bonsai Association
Roy Yamashiroya, Hawai'i Bonsai Association

INTRODUCTION

Bearing the name of its benefactress, Mary Elizabeth Mikahala Robinson Foster, Foster Botanical Garden is a living monument to those who nurtured it throughout history and for those who love plants today. With its majestic trees, shaded lawns, and beautiful botanic displays, Foster Botanical Garden is a veritable oasis in the middle of urban Honolulu.

Many cities around the country have spectacular botanical gardens—Washington D.C., San Francisco, New York, Atlanta, and St. Louis, Missouri. Given the flora beauty that surrounds us in Hawai'i, Honolulu deserves a botanical garden of that caliber. Granted, Foster Botanical Garden is much smaller than these gardens. However, there is much that can be done to make Foster Botanical Garden a world-class garden. In 1989, James C. Hubbard, a local landscape architect once described Foster Botanical Garden as a "wonderful, but tired little old lady who needs to catch her breath, shake her bustle, square her shoulders, spit on her hands and get to work during this second century of hers" (Hubbard, 1989). Eleven years later, current Director of the Honolulu Botanical Gardens, Heidi Leianuenue Bornhorst echoed the same sentiment at the first community meeting, "While ancient trees are wonderful, aging buildings and pathways from horse and carriage days are not always a good thing. …We need to work together to make positive improvements to our cherished Foster Botanical Garden." As the crowning jewel in the Honolulu Botanical Garden system, the time has come for Foster Botanical Garden to shine.

PURPOSE

In order for the City and County of Honolulu to appropriate funds for improvement projects at Foster Botanical Garden, a master plan for the Garden is needed. Various planning efforts have surged and ebbed throughout the history of Foster Botanical Garden since the City and County accepted Mrs. Foster's generous gift in 1931. However, the Garden is currently without a master plan. The most recent effort to develop a master plan for the Garden was initiated in the mid 1990s, but the master plan was never adopted.

This Master Plan represents a renewed effort and commitment to revitalize Foster Botanical Garden. With support from the community, the City Council, and the Department of Parks and Recreation, the time is ripe to reawaken Hubbard's "little old lady" and return her to the glory she once knew and deserves. This report describes a vision for Foster Botanical Garden, one steeped in history but poised to serve current

and future generations of plant enthusiasts with a variety of facilities and garden improvements. It includes physical design and facility programming as well as phasing plans, budgeting, and operational requirements needed to ensure the full development of the Garden.

PLANNING PROCESS

The planning process for this project involved a variety of activities, including information gathering and research, community and staff meetings, and design development and evaluation. The process began with a review of Foster Botanical Garden's history as well as previous plans, studies, reports, and documents. Several site visits were performed to examine the existing conditions at the Garden. In addition, issues relating to management and operation of the Garden including space programming, operation and maintenance, security, staffing, and financing were discussed and evaluated with the Garden staff and administration. Special design considerations including accessibility issues were also explored.

In addition to the preliminary research, a series of community meetings was held to gather input from various organizations and community members throughout each stage of development for the Master Plan. Announcements for the community meetings were published in both printed and online Internet editions of local newspapers including the *Downtown Planet*, *Honolulu Star-Bulletin*, *Honolulu Advertiser*, and *MidWeek*. Invitations and meeting reminder notices were mailed directly to community members and representatives of key organizations who have ongoing relationships with Foster Botanical Garden such as the Friends of Honolulu Botanical Gardens, the Outdoor Circle, Hawaii Bonsai Association, Ikebana International, and Scenic Hawaii, among others, and to those who participated in the previous master planning effort. These invitations and notices were sent also to neighboring landowners and to the Chairs and various members of the four Neighborhood Boards that surround the Garden. In addition, the Draft Master Plan was presented to the Downtown Neighborhood Board and the Liliha/Kāpalama Neighborhood Board for their review and comment.

At the first community meeting, background information and previously proposed schemes were presented to attendees. A brainstorming session was held to identify community wants, goals, and needs for the Garden and to gather ideas for the Master Plan. Subsequent community meetings involved a presentation of the master plan at each stage of development followed by an open discussion with attendees who shared their comments, questions, ideas, and suggestions for improving the Master Plan. At the last community meeting held on February 7, 2001, the Master Plan was presented for final public review and comment. Since then, the master plan has been reviewed by City and County administration and staff and refined to reflect their input.

Throughout the process, an open line of communication with City and County staff and administrators played an integral part in ensuring the development of a realistic and effective Master Plan from the perspective of those who will be operating and maintaining the Garden. These included the Directors of the Honolulu Botanical Gardens, Department of Parks and Recreation, Urban Forestry, as well as Botanical Garden staff and volunteers, the Assistant Director, Project Manager, and staff from the Department of Design and Construction.

BACKGROUND INFORMATION

HONOLULU BOTANICAL GARDEN SYSTEM

The island of O'ahu is graced by a collection of five botanical gardens that comprise the Honolulu Botanical Garden (HBG) system. Foster Botanical Garden is the oldest of the five gardens. The other four gardens include nearby Lili'uokalani Botanical Garden, Koko Crater Botanical Garden in Hawai'i Kai, Wahiawā Botanical Garden in Wahiawā, and Ho'omaluhia Botanical Garden in Kāne'ohe. *(Figure 1.)*

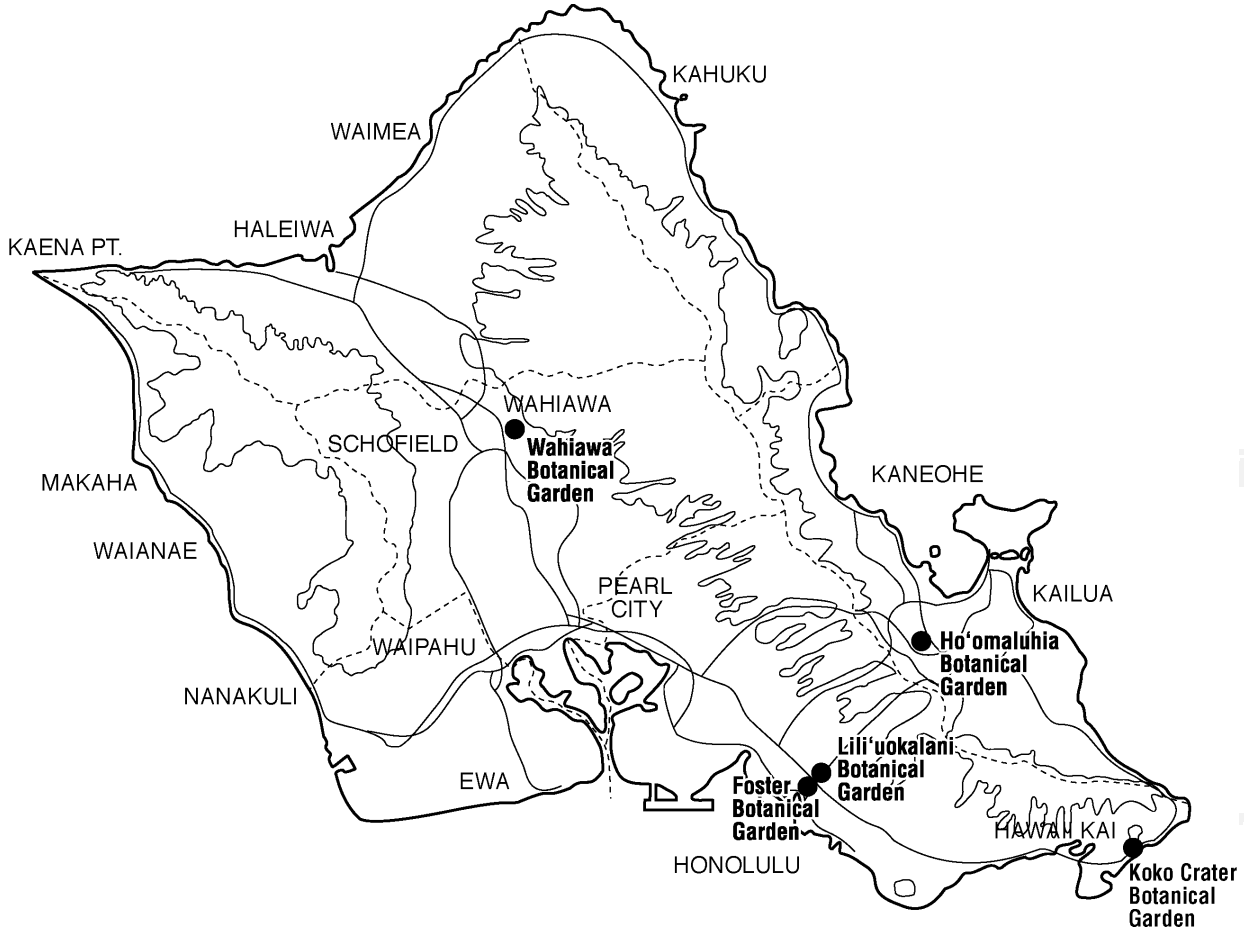

Figure 1: Map of the Honolulu Botanical Garden System

Together, the five gardens represent four different ecological settings covering 650 acres of land. These internationally renowned plant collections contain a significant number of endangered Hawaiian and exotic species and have been described as the largest and

oldest tropical collection in the United States. Due to the environmental differences among the five sites, the Honolulu Botanical Garden system covers a wide range of species from cool-moist to warm-wet to hot-dry. The multiple site system was developed many years ago in Honolulu and is now a national trend.

As described by the City & County of Honolulu's Department of Parks and Recreation, the agency that oversees the HBG system, the mission of the Honolulu Botanical Gardens is to plan, develop, curate, maintain and study documented collections of tropical plants in an aesthetic setting for the purposes of:

Conservation: The Honolulu Botanical Gardens is dedicated to the conservation of flora from the topics and subtropics including native Hawaiian flora and endangered species.

Botany: Plants from various geographical areas of the world are cultivated within the Gardens to support the scientific study of plants.

Horticulture: Only the highest standards of horticultural practice are pursued in maintaining the plant collections of the Honolulu Botanical Gardens.

Education: Emphasis is placed on developing quality botanical interpretive programs that will ensure greater public awareness of world conservation issues and increase understanding of the value of plants.

Recreation: Recreational programs that are appropriate to a botanical garden yet responsive to community needs are being developed. In this way, these gardens can renew our communities by enriching the quality of life.

FOSTER BOTANICAL GARDEN

Foster Botanical Garden lies on 13.5 acres of gently sloping land on the *mauka* side of Downtown Honolulu and Chinatown on the Island of O'ahu (Tax Map Keys: 1-7-07:01 and 02, 1-7-08:01 and 02). It is bounded by Nu'uanu Avenue, Nu'uanu Stream, the H-1 Freeway (Lunalilo Freeway), and Vineyard Boulevard. (*Figure 2*)

Neighboring land uses around Foster Botanical Garden include religious facilities such as the Kuan Yin Temple and the Harris United Methodist Church, public facilities such as Kauluwela School, and public parks and spaces including Lili'uokalani Botanical Garden, River Street Promenade, College Walk Mall, and Kauluwela Park. There also are various commercial and office spaces (Zippy's, Borthwick Mortuary, Aloha United Way Community Center), multi-family residential complexes such as Queen Emma Gardens, Keola Ho'onanea, and Kukui Gardens.

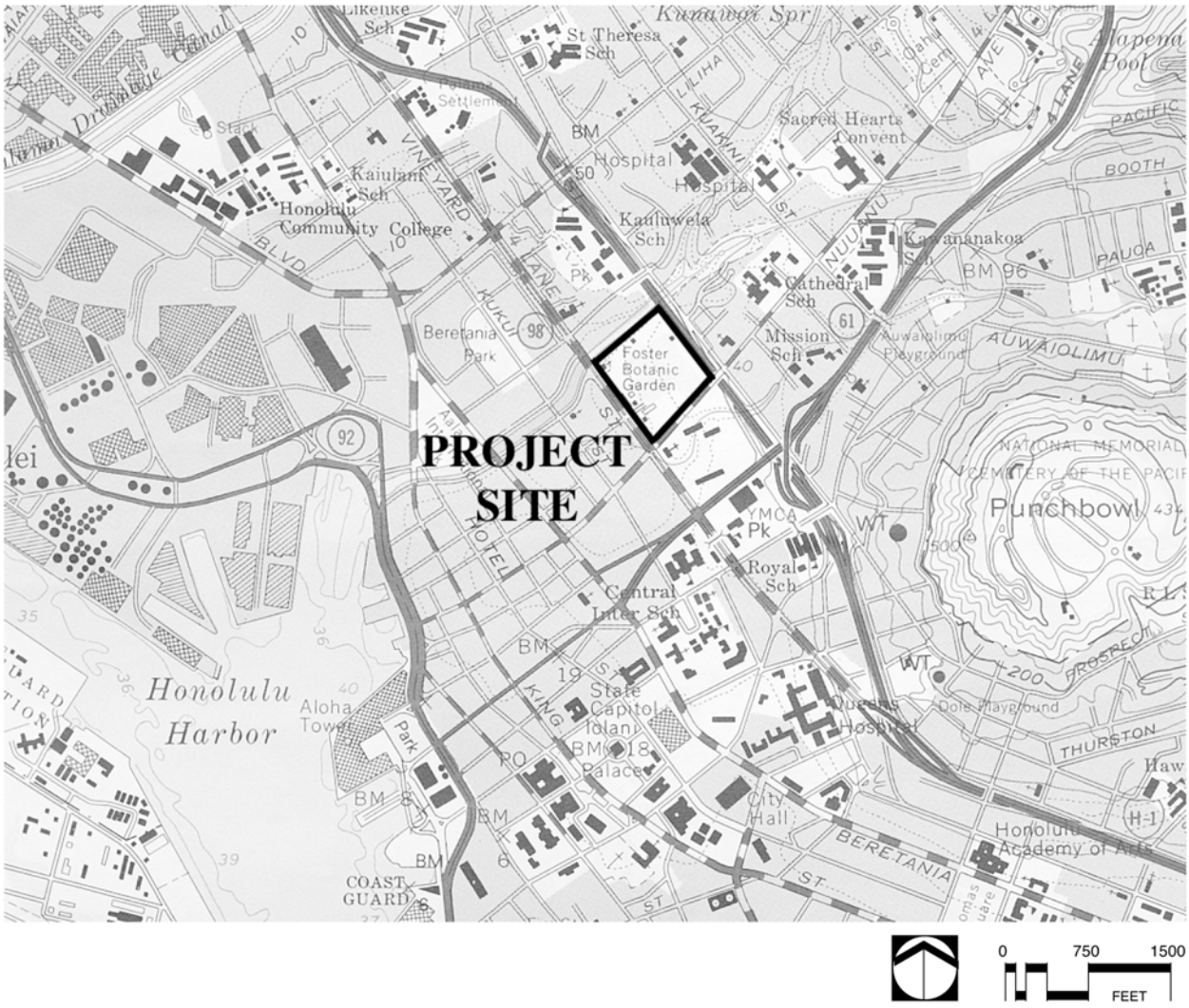

Figure 2: Location Map

Foster Botanical Garden ranges in elevation from approximately 43 feet above mean sea level (MSL) at the Upper Terrace to about 12 feet above MSL near the parking entrance at Vineyard Boulevard. The average temperatures in Downtown Honolulu range from 68 to 88 degrees Fahrenheit with an average annual rainfall of approximately 30 to 40 inches, which ranges seasonally. Trades winds are generally from the northeast. Strong winds do occur at times in connection with storm systems moving through the area. Average relative humidity ranges between 55 and 83 percent throughout the year and is typically the lowest during the summer months.

Hundreds of different botanical species from around the world are present in the Garden's various collections, including 26 Exceptional Trees (ET) that are protected by

Hawai'i State law (HRS Chapter 58) and City and County of Honolulu ordinance (ROH 41-13). These trees have been selected for protection and preservation due to their historic or cultural value, age, rarity, location, size, aesthetic quality, or endemic status.

Foster Botanical Garden also houses the main offices for the City's Division of Botanical Gardens and the Friends of the Honolulu Botanical Gardens as well as propagation facilities. The Garden has been entered on both the State and National Registers of Historic Places (Site Number 80-14-1389) in 1988 and 1993, respectively.

History

In 1851, a young Prussian physician by the name of William Hillebrand found his way to Hawai'i in search of a warm climate hospitable to his health problems. In the care of an American doctor, Dr. Wesley Newcomb and his stepdaughter, Anna Post, Hillebrand recovered remarkably well. A year later, Hillebrand married Ms. Post and soon after, began amassing land in Nu'uanu. He built a house for his family and continued to purchase and lease land for his expanding garden. Hillebrand's love for horticulture helped him create a legendary collection known for its beauty and diversity. He began his gardens by gathering local species and convincing sea captains to bring him outside specimens from their travels. By 1854 he had reportedly collected 160 different species of plants in his gardens. These plants and the lands on which they were cultivated were the beginnings of the Foster Botanical Gardens of today.

Hillebrand had a successful career as a physician in the islands and eventually was granted the position of personal physician to the royal family, and later the directorship of the Queen's Hospital at its founding in 1859. Later, connections with the Hawai'i Bureau of Immigration and his earlier successes allowed him to travel to Asia in 1865. These trips focused on a search for new labor sources for the growing sugar industry and a possible means to control leprosy which was afflicting the islands. However, during these trips he also sent back plant, bird, and mammal specimens that he thought would be desirable in Hawai'i as part of a commission funded by the Planters Association and the Royal Hawaiian Agricultural Society. In later years, Hillebrand became more focused on native Hawaiian plants and spent his time traveling to other Hawaiian islands for botanical exploration and making contacts with local botanists who were able to send him specimens.

Years later in 1871, Hillebrand and his family unexplainably left the islands and moved to Europe. He spent his final years in Germany, but continued to work on his Hawaiian flora collection. By the time of his death in 1886, he had finished writing a book entitled *Flora of the Hawaiian Islands*, a culmination of his work with native Hawaiian plants. The book was published in 1888 by his son and dedicated on behalf of Hillebrand to the Hawaiian people. His Hawaiian home was rented during his time away from the

islands until 1880 when it was sold to a neighbor, a young entrepreneur from Nova Scotia and his part-Hawaiian wife, Thomas and Mary Foster.

Thomas Foster ran a ship building business in Rhode Island with his brother before the two of them decided to try their hand in the Pacific shipping business. After moving to Hawai'i in 1857, Foster met and married Mary Elizabeth Mikahala Robinson, the eldest daughter of James Robinson, the prominent local ship builder, in 1861. With financial help from Mary's father, the Fosters bought property just *mauka* of the Hillebrands' driveway near the intersection of Nu'uanu Avenue and School Street. There, they built a modest residence and settled down. Years later in 1880 when Hillebrand decided not to return to Hawai'i, he sold the house and gardens to the Fosters.

In 1884, the Fosters removed the existing Hillebrand house and built a mansion with a 5-story tower which would allow Thomas to see his passing ships. Mary enjoyed the gardens and spent much of her time renovating them. One of her contributions was the building of an *'auwai*, or canal system for irrigation. The gardens remained a place for the Foster family to play and relax.

Thomas passed away five years later in 1889 and left Mary alone. For several years, Mary chose to live at her sister's home. With the Nu'uanu house empty, the Foster gardens fell into a state of disrepair. Mary later returned, but found the tangles of the garden appealing and refused to have them thinned. She continued to add to the gardens and is responsible for the exceptional Bo Tree found in the garden today, a specimen propagated from what is believed to be the oldest historical tree in the world.

Another figure of great importance to Foster Botanical Garden was Harold L. Lyon. Lyon moved to Hawai'i from Minnesota in 1907 to work for the Hawaii Sugar Planters Association (HSPA). Besides working on projects to cure diseases afflicting sugar cane, Lyon also worked on projects that sought to reforest the watershed areas of the island, an issue important to sugar planters. Lyon was a botanist who specialized in trees and it is understandable how the towering trees of the Foster gardens enticed him to seek out Mary Foster and develop a formal relationship with the widow.

Through encouragement from Lyon, Mary decided the gardens were special, yet were in need of constant maintenance to repair years of neglect. In an agreement which helped the sugar planters, but was also an opportunity for Mary to ensure Lyon would remain on-site to supervise her gardens, Mary leased the HSPA nearly two acres of her property fronting Vineyard Street as an addition to their nursery. Her only stipulation required that the HSPA gardens were made to complement her already existing gardens. As a result, the grounds were graded and one of the first HSPA experiment stations was established at the property. By 1925, Lyon had developed what he considered the best-equipped plant nursery in the Hawaiian Islands.

On December 19, 1930, Mary Foster died at the age of 86. She bequeathed her home and gardens (approximately 5 acres) to the City of Honolulu. She placed a stipulation on the transferal of the property that required the City and County of Honolulu to "accept and forever keep and properly maintain the (gardens) as a public and tropical park to be known and called Foster Park" and left $10,000 for initial improvements. While this was a generous gift, it was one that the city had a problem accepting. Economic times were slow in Hawai'i and the City was not equipped to maintain the park. In an unorthodox agreement, it was finally decided that the HSPA would manage the park, seeing as they were using part of it for their nursery already, and Lyon would become director for the garden. The Department of Parks was able to accept the gift and Foster Park and Gardens opened its doors to the public on November 30, 1931.

Lyon was responsible for many improvements to the grounds including thinning of the tangled overgrown areas, replacement of the *'auwai* with sprinkler systems, and the construction of a house for the resident superintendent from remnants of the Foster house. One of the main attractions at the Garden and the pride and joy of Lyon was the magnificent orchid collection. Built from generous contributions from the community and the efforts of Lyon, the extensive collection was housed in a large glass greenhouse Lyon ordered from the Metropolitan Greenhouse Corporation of Brooklyn, NY. Also created during those first years of the park was the Palm Garden. Through years of service to the park, Lyon is credited for designing Foster Botanical Garden as we know it today.

Figure 3: Dr. Harold L. Lyon

For the next twenty years the garden slowly accumulated more properties through the purchase of the HSPA nursery and several lots along School Street. Also, in the 1950's, several acres of land were received from the Bishop Estate along Nu'uanu Stream. In 1957, Dr. Harold Lyon passed away and Paul R. Weissich filled his position as Director of the Gardens.

Weissich, a landscape architect from California, moved to Hawai'i in January 1950 and joined the staff of the City's Parks and Recreation Department. As Director, Weissich organized Foster Botanical Garden through the creation of a master plan which set goals for future growth. His plans were altered over the years, however, as small

sections of land were added and then taken away from the Gardens due to road expansions along Vineyard and Nu'uanu and the construction of the H-1 Freeway which removed a 140-foot wide strip along its *mauka* boundary. Eventually, in 1964, the Garden reached its present confines with the addition of a two-acre parcel on the corner of Vineyard Boulevard and Nu'uanu Avenue, an area that Weissich developed as the Economic Garden. That year also saw the opening of the Harold L. Lyon Orchid Garden, a memorial to the late director's efforts in cultivating orchids. A final specialized collection was added a year later in 1965 called the Prehistoric Glen, which features a large collection of primitive plants relating to the Coal Age. During Weissich's tenure as director, various educational programs and fundraising events such as the Annual Plant Sale and A Midsummer Night's Gleam were established and became local traditions at the Garden.

Weissich retired as Director of the Honolulu Botanical Gardens in 1989. Michael S. Kristiansen, a horticulturalist and native of South Africa, succeeded him and left the post in 1996. Heidi Bornhorst, the current Director, was born and raised in Hawai'i and was appointed as Director in February 1999. She has worked intensively with native Hawaiian plants, landscape development and maintenance. She also has emphasized arboriculture and education at the gardens and continues to expand the various programs and collections developed at the five Honolulu Botanical Gardens.

SITE ANALYSIS

As highlighted in the gardens History, Foster Botanical Garden has undergone several renovations and witnessed remarkable changes to the City of Honolulu throughout its lifetime. This section of the report describes key site characteristics both internal and external to the Garden that affect the design, layout, and development of the master plan. A graphic site analysis is presented in Figure 4.

TOPOGRAPHY

The topography of Foster Botanical Garden consists of gentle slopes and flat terraced areas, which are remnants of the old Foster house site. According to the City's survey of the Garden, the high point of the Garden is located near the *mauka* property line on the Upper Terrace. Here, the ground surface is 43 feet above mean sea level (MSL). The Garden slopes downward towards both Nu'uanu Stream and Vineyard Boulevard reaching 12 feet above MSL at both edges. The only area of relatively steep slopes (over 30% slope) is a strip of land roughly 30 feet wide near the parking lot and Nu'uanu Stream that runs from the gift shop towards the *mauka* property boundary.[1] In Figure 4, the narrowly spaced topographic lines indicate these steeper slopes.

GARDEN AREAS AND BOTANICAL COLLECTIONS

Foster Botanical Garden houses some of the oldest plant specimens in the HBG system. Foster Botanical Garden is home to an internationally recognized collection of plant species including 26 Exceptional Trees protected by ordinance. These trees as well as an additional 20+ trees identified by Garden staff as trees to be protected and maintained are shown in Figure 5.[2] Some of the unique specimens include:

- Bo Tree (*Ficus religiosa*) – a gift to Mary Foster from a Buddhist monk in Sri Lanka, believed to be a propagule of the original Bo Tree in India under which Prince Gautama achieved enlightenment and became the Buddha.

- *Gigasiphon macrosiphon* - native to tropical East Africa, this medium sized tree is a highly endangered species and is nearly extinct in the wild.

[1] Please note that the elevations are reported from a topographical survey performed originally in 1961 by Walter P. Thompson. Current terrain may differ from this representation and a new survey may be needed for engineering and construction purposes.
[2] Please note that not all plant material is shown in Figure 4 or Figure 5.

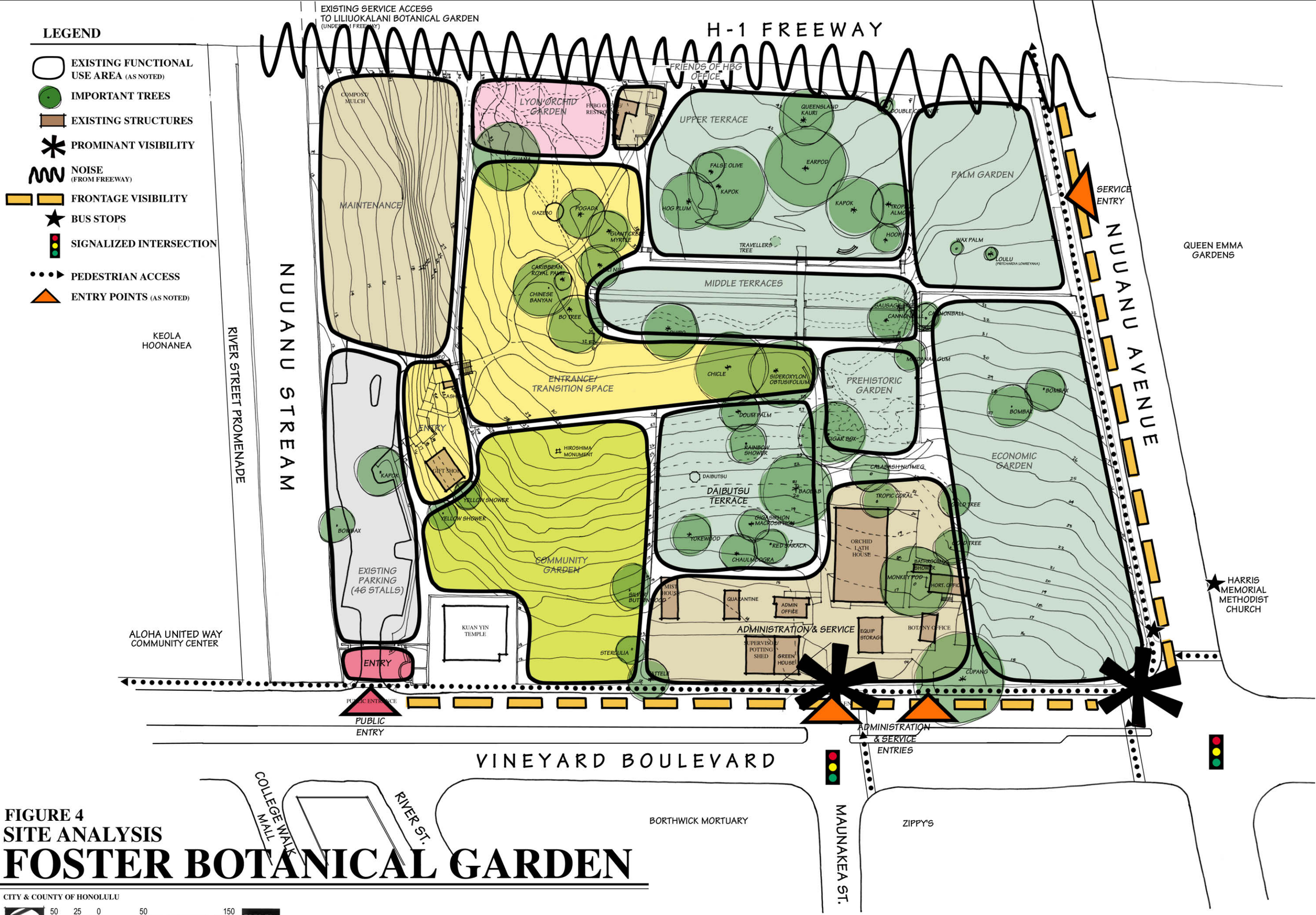

FIGURE 4
SITE ANALYSIS
FOSTER BOTANICAL GARDEN
CITY & COUNTY OF HONOLULU

EXISTING SERVICE ACCESS TO LILIUOKALANI BOTANICAL GARDEN
(UNDER H-1 FREEWAY)

H-1 FREEWAY

KEOLA HOONANEA

RIVER STREET PROMENADE

NUUANU STREAM

NUUANU AVENUE

QUEEN EMMA GARDENS

COMPOST MULCH

LYON ORCHID GARDEN

FRUG OFFICE RESTROOMS

UPPER TERRACE

QUEENSLAND KAURI

DOUBLE COCONUT

GUANA

FALSE OLIVE

EARPOD

KAPOK

HOG PLUM

KAPOK

TROPICAL ALMOND

PALM GARDEN

GAZEBO

POGADA

GIANT CREEK MYRTLE

HOOP PINE

WAX PALM

LOULU (PRITCHARDIA LOWREYANA)

TRAVELLERS TREE

CARIBBEAN ROYAL PALM

PILI NUT

MIDDLE TERRACES

CHINESE BANYAN

BO TREE

QUIPO

SAUSAGE TREE

CANNONBALL

CANNONBALL

MINDANAO GUM

INFO

CHICLE

SIDEROXYLON OBTUSIFOLIUM

PREHISTORIC GLEN

BOMBAX

BOMBAX

ASHERS

DOUM PALM

HIROSHIMA MONUMENT

RAINBOW SHOWER

GIGAR BOX

CALABASH NUTMEG

ECONOMIC GARDEN

KAPOK

GIFT SHOP

DAIBUTSU

DAIBUTSU TERRACE

BAOBAB

TROPIC CORAL

GOLD TREE

YELLOW SHOWER

YELLOW SHOWER

COMMUNITY GARDEN

GIGASIPHON MACROSIPHON

BOMBAX

TOKEWOOD

RED STARACA

ORCHID LATH HOUSE

GOLD TREE

CHAULMOOGRA

BATHROOMS/ SHOWER

MONKEY POD

SHORT OFFICE

HARRIS MEMORIAL METHODIST CHURCH

EXISTING PARKING (46 STALLS)

SILVER BUTTONWOOD

MIST HOUSE

QUARANTINE

ADMIN OFFICE

ALOHA UNITED WAY COMMUNITY CENTER

KUAN YIN TEMPLE

ADMINISTRATION & SERVICE

EQUIP STORAGE

BOTANY OFFICE

STERCULIA

SUPERVISOR/ POTTING SHED

GREEN HOUSE

TATTLER

CUPANIA

PUBLIC ENTRANCE

MAINTENANCE ENTRANCES

VINEYARD BOULEVARD

COLLEGE WALK MALL

RIVER ST.

BORTHWICK MORTUARY

MAUNAKEA ST.

ZIPPY'S

LEGEND

- **EXCEPTIONAL TREES** (PROTECTED BY ORDINANCE)
- **IMPORTANT TREES**
- **TOPOGRAPHY** (FEET ABOVE MEAN SEA LEVEL)

50 25 0 50 150
FEET

PBR HAWAII

FIGURE 5
EXISTING FACILITIES & SIGNIFICANT TREES
FOSTER BOTANICAL GARDEN

- Chaulmoogra Oil Tree (*Hydnocarpus anthelmintica*, Burma) and the Doum Palm (*Hyphaene thebaica*, Egypt) - these specimens date back to the 1910s and 1920s and are linked with Joseph Rock, a botanist well known for his work in Hawaiian botany.

- Native Loulu (*Pritchardia lowreyana*) - Pritchardias are the only palms native to Hawaii. This specimen is nearly 150 years old.

A complete list of the exceptional and significant trees labeled in Figure 5 is provided in Appendix A.

Visitors experience a variety of thematic botanical areas as they walk through the Garden. Traveling in a clockwise direction beginning at the public entrance they are: the Croton Terrace and Bromeliad Garden, the Lyon Orchid Garden, the Upper Terrace, the Palm Garden, the Prehistoric Glen, the Economic Garden, the Daibutsu Terrace, and the Middle Terraces, which contain a variety of heliconias, gingers, palms, and aroids. Some of the larger trees on the main terrace date back to the 1850s and include 13 specimens that are listed with the American Forestry Association as the largest of their species existing in the United States.

Foster Botanical Garden also houses the Foster Community Recreational Garden. It is located in a rather large, sunny area outside the main Garden grounds *mauka* of the Kuan Yin Temple. Fifty to sixty garden plots are available for cultivation by nearby residents.

EXISTING FACILITIES

The existing facilities at Foster Botanical Garden and their respective uses are listed below in Table 1 and shown in Figure 5. These elements are numbered or lettered in both the table and figure. The table includes current uses, the building names as they are identified on the Walter P. Thompson topographical survey (originally completed for the City and County of Honolulu in March 1961 and last updated in September 1993), approximate area (square feet) of the footprints as measured off the topographical survey, and the number of people housed in the facility when applicable.

Table 1: Existing Facilities and Space Usage

No.	Current Use(s)	Label on Thompson Topographical Survey	Approximate Area* (S.F.)	Number of Occupants
Buildings/Structures				
1	Information Desk	(none)	136	2
2	Cashier	(none)	108	1 - 2
3	Gift Shop	(not included)	1000**	2 - 5
4	FHBG Office/Restrooms	Office & Comfort Station	674	
5	Mist House/Propagation Bench (fiberglass cover)	(none)	~900	
6	Quarantine House	Green House	594	
7	Honolulu Botanical Gardens Administration Office	Classroom Bldg.	600	4.5
8	Orchid Lath House	Lath House	6480	
9	Bathroom/Showers	(none)	200	
10	Horticulture Office/Kitchen	Office Bldg.	968	5
11	Botany Office/Label Room/Storage	Office Bldg.	512 (half office, half storage)	1+2 volunteers
12	Equipment Storage	Storage Bldg.	1176	
13	Green House (covered)	Green House	1638	
14	Supervisor Office/Potting Shed	(none)	1344	
15	Employee Parking Lot	(none)	~9 stalls (dbl)	
16	Visitor Parking Lot	Parking	46 stalls	
17	Large Equipment Storage (near Compost/Mulch/Parking Lot)	(none)		Backhoe, 2 trailers, mulcher
Propagation Areas				
A	Benches (near Orchid Lath House)	(none)	~3620	
B	Benches (near Horticulture Office)	(none, near monkey pod tree 425)	~955	
C	Benches (*makai* of Equip. Storage near Vineyard)	(none)	2830	
D	Benches (bet. HBG Office and Quarantine House)	(none)	~1600	
E	Benches (bet. Quarantine House and Mist/Prop Bench)	(none)	~3025	
F	Open Lath House/Benches	Hot House	4704	
G	Composting/Mulch Storage	(none)	~3900	

*Areas as measured off of Thompson topographical survey. For the built structures, the footprints were used to calculate the area.
**Area measured off of City & County Facilities Development Division File No. 28/60 "Foster Botanical Garden Repair and Repavement of Parking Lot."

Many of the existing structures are aging and deteriorating. Portions of the Botany Office building have been declared unsafe by the City and are no longer usable. The staff has reported that they consistently experience problems with phone lines and electrical power. Due to limited space, various program uses are scattered among different buildings, which often hampers task sharing and workload coordination. Currently, the Director and her administrative staff are separated from the educational coordinators and the horticulturalists. Other facility needs include a larger restroom/shower and locker room for the staff and more storage space for plant sale and special event equipment.

Figure 6: Existing Visitor Entrance

ENTRIES AND ACCESS

There is a single entry and exit point for visitors located near the public parking lot (*Figure 5, nos. 1 and 2*). Visitors arriving at Foster Botanical Garden by car enter the public parking lot through the main gate on Vineyard Boulevard near Nu'uanu Stream. The entry is set back from the street and tucked behind the Kuan Yin Temple, which obscures its view from drivers traveling *ewa* on Vineyard Boulevard. (*Figure 6*) Visitors traveling to Foster Botanical Garden on the public bus disembark at either one of two bus stops located on Nu'uanu Avenue near the intersection of Vineyard Boulevard.

The staff and maintenance crews access the Garden from two existing driveways on Vineyard Boulevard near the Maunakea Street intersection. Another service only entrance is located on Nu'uanu Avenue near the H-1 Freeway overpass. This gate is typically locked and used only to access the Upper Terrace and the Palm Garden. The maintenance area near Nu'uanu Stream is reached through the public parking lot (*Figure 4*).

At different times throughout its history, the Garden has had entrances off of Nu'uanu Avenue and School Street before the H-1 Freeway was constructed. If one can imagine, what is now the backside of the Garden—the Upper Terrace, the Friends of Honolulu Botanical Gardens office, and the Palm Garden—was actually the front of the Garden up until the early 1960s, complete with a 30-car parking lot and a commemorative plaque dedicating the Garden to William Hillebrand, Mary Foster, and Harold Lyon. The administrative offices and greenhouses hidden behind the mock orange hedge along Vineyard Boulevard literally were the "back of the house" service areas of the Garden. Once the freeway was built, the Garden was forced to flip its orientation. The parcels along Nu'uanu Stream and Vineyard Boulevard were acquired in 1961 with the money received for the lands absorbed by the freeway and the Vineyard Boulevard expansion, and the current public entrance, gate, and parking lot were built.

CIRCULATION

Foster Botanical Garden is a 13.5-acre site that has no internal roadways other than the pedestrian paths that wind through the Garden. These paths are paved primarily with asphaltic concrete. The larger pathways are shared by visitors and maintenance vehicles, which typically consist of Cushman carts.

Many of these paths are not continuous and do not provide access to all areas in the Garden. As a result, wayfinding for visitors through some areas, particularly the Economic Garden and the Palm Garden, can be confusing and does not encourage exploration. In addition, the maintenance staff are not able to access many areas of the Garden with their trucks and equipment due to grade changes, unstable ground, and dead-end paths. The staff must back track or take circuitous routes, making routine maintenance rounds inefficient and hazardous.

Figure 7: Freeway Underpass near Nu'uanu Stream

Before the construction of the H-1 Freeway, Foster Botanical Garden and Lili'uokalani Botanical Garden were separated only by School Street. Once the freeway was built, the direct, non-grade separated public and maintenance link along Nu'uanu Stream was lost. Concrete ramps from both gardens were built and currently connect under the freeway (*Figure 7*). However, this passageway is located within the Nu'uanu Stream channel and is subject to flooding during heavy rains. The passageway is gated and locked to keep the public out, but both staff and community members have noted that homeless transients frequent the area. The notion of reconnecting the two gardens for both public and staff use by improving the underpass and ramps has been discussed over the years, but never implemented.

PARKING

The visitor parking lot is located at the southwestern corner of the property near Nu'uanu Stream and is entered from Vineyard Boulevard near the Kuan Yin Temple. There are 46 stalls, two of which are handicap accessible. There are no designated stalls for bus parking. However, there is a large turnaround area on the *mauka* end of the parking lot. Garden staff and users alike have noted that the parking lot is adequate for the current number of daily visitors, but not for their more popular events such as the Annual Plant Sale. There is street parking in front of Foster on Vineyard Boulevard, which supplements the Garden parking lot during these events. However, these spaces often fill up by mid morning and do not turn over frequently. The Garden staff also has noted that patrons of the Kuan Yin Temple often park in the Garden parking lot without permission. The Kuan Yin Temple has no onsite parking of its own. Temple patrons are easily tempted to park at Foster Botanical Garden since the parking lot is adjacent to the temple and rarely monitored.

Onsite staff parking is scarce. Eight to ten cars squeeze into the paved area in front of the Horticulture Office (*Figure 5, no. 15*) by double parking and blocking the driveway. Up to four trucks can be parked in the paved area between the Administration Office and Equipment Storage (*Figure 5, no. 12*). Currently, there is not enough space to accommodate all City trucks, utility vehicles, and staff parking in these areas.

UTILITIES

Water for the subject property is drawn from a 12-inch line within Vineyard Boulevard and distributed throughout the Garden through 4-inch distribution lines. Smaller lines run underground and along fence lines throughout most parts of the Garden to which the staff manually attach sprinkler heads for general irrigation purposes.

Figure 8: Existing Irrigation Tap

Wastewater is collected on-site by a series of 8, 6, and 4-inch sewer laterals and is discharged into the City and County's sewer main via a 10-inch line in Vineyard Boulevard.

Hawaiian Electric Company (HECO) supplies electric power to the site via underground lines which run along Vineyard Boulevard. These lines connect to an onsite transformer box located near the ET Cupang (*Parkia javanica*) and first maintenance driveway on Vineyard Boulevard and distribute power throughout the Garden. On the northwestern side of the property *mauka* of the Information Desk and Cashier, the lines transition to overhead lines for a short 310-foot distance.

Telephone and Internet connection are currently provided by Verizon Hawaii. Internet connection is made using digital subscriber line (DSL) technology, which allows existing phone lines to carry both voice and two-way Internet transmissions.

GREEN WASTE

Green waste collected from Foster Botanical Garden is composted and mulched on site and stored near the Service Area on the northern corner of the property. They are then reused in the Garden for soil amendments and tree and plant protection.

GARDEN OPERATIONS

Administration and Staff

At present,[3] Foster Botanical Garden has a dedicated staff of seven full-time employees who maintain the Garden. They consist of a Supervisor, two Plant Propagators, one Orchid Propagator, and three Nursery Workers. There are eleven full-time HBG staff members including the Director, the Superintendent, two Education/Recreation Specialists, and three administrative staff. One of the Education/Recreation Specialists is the Community Garden Coordinator for the City & County of Honolulu. Other staff members include a Botanist, Horticulturist, Arborist, and Orchid Horticulturist. All of these employees currently have their home offices located at Foster Botanical Garden. Typically, the staff at Foster Botanical Garden start their work shifts between 6:30 AM to 7:30 AM and finish by 3:30 PM to 4:00 PM.

Volunteers

Foster Botanical Garden, like with the rest of the Honolulu Botanical Gardens, relies upon the help of many volunteers to aid in the day-to-day operations of the gardens. Volunteers man the Cashier and Information Desks, the Gift Shop, and also assist with garden maintenance. The primary support organization for Foster is the Friends of the Honolulu Botanical Gardens who has its main office on the grounds of Foster Botanical Garden.

Friends of Honolulu Botanical Garden. The Friends of the Honolulu Botanical Gardens is a volunteer support organization started in 1960, which provides the garden system with invaluable contributions. They are a 501c(3) nonprofit organization dedicated to the development, maintenance and enhancement of the Honolulu Botanical Gardens. Their efforts include manning the Information Desk and Gift Shop, giving guided tours, and sponsoring fund raising efforts such as the popular Semi-Annual Plant Sales, as well as a myriad of other special projects and educational programs.

Visitor Counts and Information

The Garden's regular hours of operation are from 9:00 AM to 4:00 PM daily except for Christmas and New Year's Days. Guided tours are given daily and special tours may also be arranged with the staff. General admission fees are $5.00 for those 13 years and older, $3.00 for Hawai'i residents, and $1.00 for children between the ages of 6 and 12. Children under 5 years old are free with an accompanying adult. Annual family passes

[3]It is expected that 3 additional employees (1 propagator and 2 nursery workers) will be added to the staff at Foster Botanical Garden in the near future. Exact start dates were not known at the time of writing.

are also available for $25.00 and can be used for admittance to both Foster Botanical Garden and the Honolulu Zoo.

Table 2: Foster Botanical Garden Annual Visitor Counts, 1993-2001

YEAR	VISITORS
1993	65,000
1994	66,500
1995	65,242
1996	51,497
1997	48,461
1998	46,863
1999	48,434
2000	50.237
2001	41,011

Source: State of Hawaii Data Books 1996, 1998, and 1999 and Honolulu Botanical Gardens.

Foster Botanical Garden receives roughly 41 to 67 thousand visitors a year. Table 2 shows annual visitor counts from 1993 to 2001. These tallies are much smaller than those from the 1970s and 1980s when the Garden used to receive 100,000 visitors a year, probably due to the introduction and increase in admission fees. However, the Garden has become a favorite setting for weddings and photographic sessions. Typically, Foster Botanical Garden hosts 50 to 100 wedding ceremonies and nearly the same number of wedding photographic sessions. There is no charge for taking photos, but a permit is required. Guided tours are given daily at 1:00 PM Monday through Friday and are available by special arrangement. Thousands of school children and visitors participate in these tours annually.

There are no food concession stands at the Garden, but visitors are encouraged to bring a lunch and picnic at the Garden. There are a few tables near the entrance that are usually filled during lunch time by visitors who do not want to pay the entrance fee but enjoy eating their lunch in the natural setting of the Botanical Garden.

MASTER PLAN FOR FOSTER BOTANICAL GARDEN

Throughout its history, Foster Botanical Garden has experienced a world of change. It has been transformed from a backyard garden to a private nursery to a public botanical garden and park. Its plant collections are internationally renown, but its buildings have become dilapidated and its pathways worn. It has witnessed the growth of Downtown Honolulu and endured the crush of encroaching streets and highways. Yet the Garden itself remains virtually unchanged since the 1970s. It is now time to reawaken the "tired old lady," to breathe new life into the Garden, and revive it as a major attraction for visitors and *kama'aina* alike.

Figure 9: The Historic Upper Terrace

GOALS

Based on input gathered from staff, volunteers, local garden clubs, and community members, a range of goals were developed for the master plan. These include:

- Improve facilities—visitor accommodations, administration offices, and maintenance facilities
- Increase visitorship, both visitor and kama'aina, and the quality of the visitor experience at the Garden
- Improve the visibility of the Garden and its main entrance
- Provide meeting space for both staff and local garden clubs and organizations
- Improve display space and signage of botanical collections
- Locate all administrative functions close to each other
- Create a safe facility that can be secured when not in operation
- Mitigate noise and visual impacts from the H-1 Freeway

- ~ Improve orchid display and maintain tribute to Dr. Lyon—protect from theft and predators
- ~ Improve circulation throughout Garden for both visitors and maintenance vehicles—circular layout preferred
- ~ Provide a variety of garden collections and attractions
- ~ Provide educational facilities/classrooms
- ~ Increase parking
- ~ Maintain open spaces within the Garden by limiting structures to previously developed areas
- ~ Develop implementation plan for the phased improvement of the master plan

In addressing these goals, the master plan for Foster Botanical Garden attempts to balance the old with the new. It preserves historical elements such as the terrace walls from Mary Foster's estate as well as memorable spaces within the Garden such as the Upper Terrace (*Figure 9*) and the Daibutsu Terrace. However, the master plan reinvigorates the Garden by opening up its public façade, improving visitor, botanical, and service facilities, and adding new garden areas. Guided by an understanding of its history and developed with input from those who know the Garden best, the master plan grooms Foster Botanical Garden for an even brighter future. A graphic of the new master plan is presented in Figure 10.

IMPROVED STREET FRONTAGE AND VISIBILITY

Although occupying a full city block and located near a prominent corner near Downtown Honolulu and Chinatown, Foster Botanical Garden does not have an obvious public presence. Much of the Garden is hidden behind tall mock orange hedges and overgrown greenery along Vineyard Boulevard and Nu'uanu Avenue (*Figure 11*). According to both past and present directors, it is not uncommon to hear local residents admit that they do not know where Foster Botanical Garden is located. Many are surprised when told that they probably drive past it everyday on their way to work Downtown.

LINK TO LILI`UOKALANI BOTANICAL GARDEN
(UNDER H-1 FREEWAY)

H-1 FREEWAY

KEOLA HOONANEA CONDOMINIUM

RIVER STREET PROMENADE

NU`UANU STREAM

NU`UANU AVENUE

QUEEN EMMA GARDENS CONDOMINIUM

LEGEND

- EXCEPTIONAL & IMPORTANT TREES
- OTHER EXISTING TREES
- PROPOSED TREES
- HISTORIC WALLS
- PATHS
- EXISTING STRUCTURES TO BE RENOVATED
- PROPOSED STRUCTURES
- VIEWS
- ACCESS/ENTRY POINTS
- LAWN AREAS DESIGNATED FOR OVERFLOW PARKING
- FENCE

NOTE: NOT ALL EXISTING TREES AND PLANT MATERIAL ARE SHOWN IN GARDEN AREAS LEFT LARGELY UNCHANGED, SPECIFICALLY IN THE PALM GARDEN, UPPER AND MIDDLE TERRACES, ECONOMIC GARDEN, DAIBUTSU TERRACE, AND THE PREHISTORIC GLEN.

COMMUNITY CENTER

OPEN STORAGE

OPERATIONS & MAINTENANCE

COVERED STORAGE/I GARAGE

SERVICE AREA

QUAR

MIST HSE

GREEN HOUSES

ETHNO-BOTANICAL CENTER & RESTROOMS

NATIVE HAWAIIAN GARDEN (new)

UPPER TERRACE

PALM GARDEN

NOISE BUFFER/ WALL & DENSE PLANTING

LOW WALL/ FENCE

SERVICE ACCESS ONLY

INTERPRETIVE DISPLAY

TONGG GAZEBO

MIDDLE TERRACES

COMMUNITY GARDEN (relocated)

2 PRITCHARDIA HILLEBRANDII (existing)

ECONOMIC GARDEN

PREHISTORIC GLEN

ORCHID CLASSROOM (may be removed)

BONSAI GARDEN (new)

LYON ORCHID CONSERVATORY & GARDEN

DAIBUTSU

DAIBUTSU TERRACE

ADMIN OFFICES

CLASS ROOMS

CAFE

VISITOR CENTER

ASIAN GARDEN (new)

SEATING AREAS (TYP. SYMBOL)

ROTATING DISPLAY GARDEN (new)

EXISTING BUS STOP

KUAN YIN TEMPLE

VISITOR PARKING
(AS SHOWN: 54 STANDARD STALLS, 3 HC, 2 VAN)

ENTRANCE GARDEN (new)

"FOSTER BOTANICAL GARDEN" GATEWAY

HARRIS MEMORIAL METHODIST CHURCH

PEDESTRIAN ENTRANCE

GATEWAY FEATURE

GARDEN ROCK WALL

SERVICE ACCESS ONLY

MAIN ENTRANCE

VIEW FROM VINEYARD BLVD.

VIEW FROM MAUNAKEA ST.

VIEW FROM NUUANU AVE.

VINEYARD BOULEVARD

COLLEGE WALK MALL

RIVER ST.

BORTHWICK MORTUARY

MAUNAKEA ST.

ZIPPY'S

FIGURE 10

MASTER PLAN

FOSTER BOTANICAL GARDEN

CITY & COUNTY OF HONOLULU

50 25 0 50 150 FEET

PBR HAWAII

Figure 11: View of Foster Botanical Garden from the intersection of Vineyard Boulevard and Maunakea Street

Former director, Paul Weissich, explained that the reason the Garden remains hidden behind the hedges is because the buildings along Vineyard Boulevard are in such poor shape. "When those buildings were constructed, no one ever expected Vineyard Boulevard to be the front of the Garden, much less become the major street that it is." As noted earlier, before the H-1 Freeway was built, the main entrance to the Garden was located on School Street. Before that, visitors entered the Garden from Nu'uanu Street. Vineyard Boulevard literally was the back door of the Garden, used primarily by service and maintenance personnel.

Current director, Heidi Bornhorst, explained that they recently placed a small, reflective sign on its fence at the corner of Vineyard Boulevard and Nu'uanu Avenue (*Figure 12*). Despite its small size and simplicity, the sign has already increased the Garden's visibility. However, much more could be done to improve its public presence.

Figure 12: Existing View of Foster Botanical Garden from the corner of Vineyard Boulevard and Nu'uanu Avenue

With its primary frontage on Vineyard Boulevard, the Garden needs to be reoriented towards this street. The Master Plan recognizes this opportunity and relocates its main entrance at the top of Maunakea Street (*Figure 10*) where there is an existing signalized intersection. Selective removal and trimming of the mock orange hedge along Vineyard Boulevard will open up and frame vistas into the Garden. A grand gateway with elegant signage and botanical displays flanking the main entrance

will herald the Garden to drivers traveling along Vineyard Boulevard and up Maunakea Street from Chinatown. Two existing O*rbignya martiana* palms located at the corner of Vineyard and Nu'uanu will be incorporated into a landmark gateway framing the pedestrian entry at this prominent intersection. Arching above the gateway will be a distinctive "Foster Botanical Garden" sign. A sweeping Entrance Garden will extend from the pedestrian entrance to the parking lot and the main entrance. Meandering through the Entrance Garden will be a pedestrian path that leads visitors to the new Visitor Center.

VISITOR CENTER AND ADMINISTRATIVE OFFICES

No longer hidden behind the Kuan Yin Temple, the main entrance and new Visitor Center will be the capstone of the enhanced vista along Vineyard Boulevard. Located at the head of Maunakea Street facing Vineyard Boulevard, the Visitor Center will be the main entry and exit point for the Garden and will be the centralized home for administrative personnel, volunteers, the gift shop, a classroom/meeting room, a botanical library, and a café. A larger turnaround fronts the Visitor Center, providing ample space for buses, taxis, and other vehicles to drop off visitors at the front door to the Garden.

Monkey Pod Entrance Courtyard

As visitors approach the Visitor Center, perhaps waiting for friends and family, they may seek shelter under the majestic monkey pod tree specimen standing just to the right of the entrance. Once cramped among the old office buildings, the monkey pod tree will now welcome visitors under its spectacular canopy. A new courtyard with benches and informative and botanical displays will circle the monkey pod, providing comfort and interest to visitors as they await entrance into the Garden.

Architectural Design and Program

The Visitor Center is envisioned as a group of buildings with the larger, main structure at the top of the turnaround housing visitor accommodations and smaller structures for classrooms and administrative offices connected to the main building with trellised walkways. The building design should blend into its environment and capitalize on the views and atmosphere created by the lush greenery surrounding it. Transitional indoor/outdoor spaces, such as lanais and verandas, should be incorporated into the design.

The architectural program for the Visitor Center is based on input from current Garden personnel. One of their main requests was to locate administrative and visitor service staff in close proximity to one another so that visitor services are more integrated and staff are able to help one another. Currently, the administrative staff and reception volunteers are scattered throughout the Garden. The cashier and information

volunteers are located at the entrance on the *ewa* side of the Garden, volunteers from the Friends of Honolulu Botanical Gardens at the *mauka* end, and the bulk of the administrative staff at the *makai* end of the Garden. In the new Visitor Center complex, all of these staff members will be located in one area. In addition, the buildings will be situated in an area occupied by the existing administration offices, orchid lath house, and various maintenance structures. No prime garden space would be lost to the new Visitor Center.

The architectural space program and estimated net size of these spaces (in square feet) are presented in Table 3. These figures are derived from staff input, comparable architectural standards, and local examples.[4] A grossing factor of fifteen percent has been added to account for common areas such as circulation, mechanical, and structural elements. Detailed descriptions of the programmatic spaces are presented below.

Table 3: Proposed Architectural Program for the Visitor Center

Program Space	**Area (sq. feet)**
Covered Entry and Display	600
Cashier and Information Desk	300
Volunteer Coordinator	200
Classroom/Meeting Room(s)	1,200
Adjoining Classroom Lath House	500
Café	1,000
Public Restrooms/Phones[5]	1,000
Gift Shop	1,000
Friends of Honolulu Botanical Gardens Office	300
Joseph Rock Library	300
Administration Offices	1,700
Label Room	150
Staff Kitchen/Lounge/Restroom	350
Circulation/Mechanical/Structural Space (15%)	1,290
TOTAL AREA	**9,890**

Covered Entry and Display (600 square feet). As the main point of entry for visitors, this area is envisioned as an open veranda along the front of the Visitor Center, with space for botanical and informational displays.

[4] Final dimensions will be determined during the design stage for the Visitor Center.
[5] Public Restrooms are estimated from the State Department of Health (Table 1: HAR, §11-11-9) for a 10,000 square foot facility = 667 persons.

Cashier and Information Desk (300 square feet). The Cashiers are primarily responsible for admission ticket sales. The staff manning the Information Desk responds to various visitor needs and questions. Because the two jobs work together, they should be located in close proximity of one another. The Cashier window should face the entry or be readily visible from the entry since this is the first stop for visitors. The Information Desk could be more centralized so that visitors both inside and outside of the Garden can access the desk. The proposed area will house four to six volunteers/staff members and will require space for phones and cash registers as well as storage space for brochures, maps, membership materials, displays, and other related items.

Volunteer Coordinator (200 square feet). The Volunteer Coordinator recruits, trains, and coordinates the various people who volunteer at the Garden. Currently, there are approximately 150 regular volunteers that are managed by the Volunteer Coordinator. These volunteers provide invaluable services to the Garden ranging from reception and tours, to nursery and garden aides. The Volunteer Coordinator will require desk and computer space, storage space for training materials and props including ample closet and shelf space. Currently, the Garden has only one part-time Volunteer Coordinator. However, it is suggested that this be a full-time position with at least two coordinators handling the workload.

Classroom/Meeting Room (1,200 square feet). The Classroom/Meeting Room provides meeting space and classroom space for Garden staff and activities as well as local garden and botanical clubs and organizations. It is planned as a generous 1,200 square foot space that can be divided into two smaller rooms with a sliding or air wall system. Sinks, counters, and storage space are required in both rooms for demonstrations.

Adjoining Classroom Lath House (500 square feet) will connect to the Classroom/Meeting Room so that storage and display space is available for demonstration classes. The Lath House is envisioned to be open on the side opposite of the Classroom/Meeting Room so that visitors passing by can look in on classes or view the products of these classes. Generous windows or doors should be placed on this side of the classroom lath.

Café (1,000 square feet). Based on the success of adjunct cafés such as those at the Contemporary Museum in Upper Makiki and at the Honolulu Academy of Arts, a Café at Foster Botanical Garden also may have the effect of drawing new patrons to the Garden to enjoy a sumptuous meal under a grand canopy of trees. Occupying the *ewa* wing of the Visitor Center, the Café will overlook the serene Daibutsu Terrace. The design should incorporate outdoor and veranda seating along the exterior edges of the Café. Smaller in scale than the Contemporary Café at the Contemporary Museum (2,976 sq. ft., 50 seats indoor, 24 outdoors) and the Honolulu Academy of Arts Garden

Café (3,000 sq. ft.,[6] 80 seats), the proposed Café will have kitchen and service areas estimated at 500 square feet with indoor seating (approximately 30 - 40 seats) occupying 500 square feet. Additional outdoor seating will depend upon the space available. The Café would be open primarily for lunch and could host meetings and smaller receptions. In addition, cooking classes may be held at the café when there is no lunch or dinner service.

Gift Shop (1,000 square feet). Roughly the same size as the existing gift shop, the new Gift Shop will be located on the first floor of the Visitor Center, close to the entry/exit point near the Cashier and Information Desk. Ample shelf and display space should be provided.

Friends of the Honolulu Botanical Gardens Office (300 square feet). To replace the existing office, which is planned for renovation into an Ethnobotanical Center for the Native Hawaiian Garden, a new office for the Friends of the Honolulu Botanical Gardens will be located on the first floor of the Visitor Center. They require two work desks with space for computers, a worktable, file cabinets, space for typical office equipment such as a fax machine, copier, and typewriter, as well as wall shelves. They also require ample closet space to store various materials and equipment used during their special events including the Annual Plant Sale and a Midsummer's Night Gleam.

Joseph Rock Library (300 square feet). In honor of the botanist who had catalogued the plants in Mary Fosters garden, the Joseph Rock Library will be reestablished at the Visitor Center. Three hundred square feet has been allocated to the Rock Library, which will be a shared resource for staff, volunteers, and garden clubs and organizations.

Administration Offices (1,700 square feet). The Administration Offices will house the Director and her administrative staff. In addition, the HBG Superintendent, Botanist, Horticulturalist, Arborist, Orchid Horticulturist, and two Education/Recreation Specialists including the City & County's Community Gardens Coordinator also will have their offices here.

The current staff numbers eleven people. However, the new Administration Offices will easily house an additional two to four staff depending upon the growth of programs and needed manpower at the Garden. Space allocation is based on the following estimates and will need to be refined during the design stage of the project.

[6] Kitchen and service areas estimated at 900 square feet.

Table 4: Proposed Space Requirements for Administrative Staff

Description	Estimated Area
Director's Office	200 SF
Superintendent	120 SF
Botanist, Horticulturalist, Arborist, Orchid Horticulturist	100 SF each
Education/Recreation Specialists	100 SF each
Executive Assistant	100 SF each
Clerical/Other Assistants	85 SF each
Storage/ General Workspace/ Shared Office Equipment	155 SF

Two hundred square feet is estimated for the Director's office to accommodate a computer desk, files, shelf space, and a small conference table and chairs. At a minimum, each staff member will require space for a desk, computer, files, shelves, and workspace. Certain positions have specialized space needs. For example, the Botanist requires ample shelf space for books, 2 computer stations/desks (one for an Assistant), and a lockable cabinet for a microscope and other sensitive equipment. The Education and Recreation Specialists also require ample shelf space for reference books and a storage closet for materials used in arts and craft classes. In addition, common areas are required for general office equipment such as fax, copy machine, computer modem, typewriters, file cabinets, printers, a worktable, and deep shelf storage and should be located near the Executive Assistant and clerical staff.

Label Room (150 square feet). The Label Room houses a variety of equipment and materials used to make the permanent labels identifying the botanical and common names for the plants at the Garden. Currently, the Label Room is located adjacent to the Botanist's office. Due to the frequent contact the Botanist has with the engravers, the Label Room will be located on the second floor of the Visitor Center, and can be located within relatively close proximity to the Botanist's new office. One to two volunteers/staff will work in the Label Room. Workbenches and appropriate workspace are needed for the engraving machine and other tools. In addition, storage space and cabinets should be included for materials such as the nameplates and stakes and protective gear. The Label Room will require sufficient electrical supply to power the heavy equipment and may need insulation to buffer the noise emitted from the machinery.

Staff Kitchen/Lounge and Restroom (350 square feet). The staff had requested a modest kitchen with some space for a table and chairs to eat their lunches. The Staff Kitchen/Lounge should be located near staff offices.

VISITOR PARKING AND RELOCATED MAIN ENTRANCE

Visitor traffic will enter and exit through a single access point on Vineyard Boulevard at the top of Maunakea Street. Vehicles will enter at the large turnaround and travel in a one-way, counterclockwise direction through the new parking lot. For those only wishing to drop off visitors, they may proceed around the roundabout and exit the Garden without circling the entire parking lot. The roundabout should be wide enough to accommodate standing vehicles and full-size buses on the outside of the roundabout as well as passing vehicles on the inside, allowing passengers to be unloaded without blocking or crossing traffic lanes. Taxis also should be allowed to drop off passengers in this area.

The visitor parking lot will provide 54 striped parking stalls (3 of which are handicap accessible) and 2 large van stalls. During special events when additional parking is needed, roughly 100 cars can be accommodated in the visitor lot and in designated overflow parking areas on lawns. These areas are indicated as stippled grassy areas on the master plan in Figure 10. Should visitorship increase significantly and require more permanent parking, the City could improve the area of overflow parking at the front of the Visitor Parking lot, which would add approximately twenty more stalls. A gate at the mauka end of the parking lot near the Kuan Yin Temple will be provided so that cars may travel to overflow parking areas along Nu'uanu Stream and exit through the service driveway at Vineyard and River Street for special events. In addition, to help accommodate the heavy traffic the Garden experiences during the Plant Sale, this gate will allow the Garden staff to set up a drive-through pick up area for visitors who do not wish to park but are only picking up people or paid items.

A key design element of the new visitor parking lot is that it loops carefully around three of Foster Botanical Garden's prized trees, a sprawling silver buttonwood, a unique sterculia, and the ET Tattele (*Pterygota alata*). The silver buttonwood is believed to be one of the oldest specimens brought to Hawai'i from which many propagules have been developed. It is a dramatic specimen tree that has been given ample space in the parking lot to stretch its limbs. Just *makai* of the buttonwood, the sterculia with its buttressed roots and the ET Tattele will also be protected by having the driving lane curve around the sterculia. To be carefully designed to minimize damage to the tree roots, the parking area would include an enlarged planting area around the two trees with a ten to fifteen foot buffer around the sterculia. Other trees and landscaping will be added to help shade and beautify the parking lot in a park-like setting.

As noted earlier, the main entrance to the visitor parking lot will be shifted to the top of Maunakea Street. As a result, the existing signalized intersection will require minor improvements such as adding a left-turn lane on the eastbound direction of Vineyard

Boulevard (*Figure 13*) and reprogramming the traffic lights to accommodate a four-way traffic pattern as opposed to the existing three-way pattern. The State Department of Transportation (DOT) Highways Division Right-of-Way Branch and a traffic engineer have been consulted. Based on their review and analyses, no significant traffic impacts are expected to occur at the Vineyard Boulevard intersections with Nu'uanu Avenue, Maunakea Street, and River Street. In addition, the State DOT has identified the following design conditions[7] at the relocated main entrance at Maunakea Street that will need to be met in the engineering stage of the project:

1. Left turn out from the main entrance will not be allowed since it is too close to Nu'uanu Avenue.

2. The design of the driveway access must be in compliance with current State Highways Division Standards.

3. Driveways and sidewalks must comply with current ADA requirements.

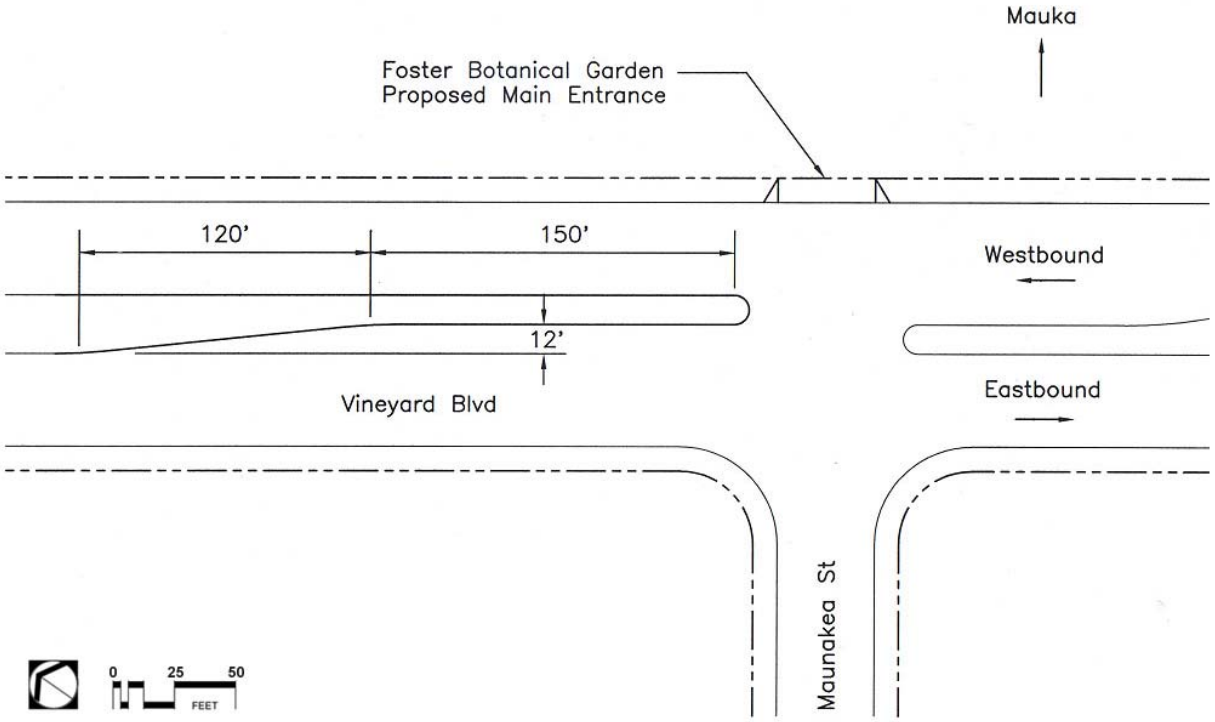

Figure 13: Conceptual Sketch of Proposed Left-Turn Lane on Vineyard Boulevard at Maunakea Street

[7] The complete list of conditions specified by the State DOT review is detailed in a letter dated February 27, 2001 and has been forwarded to the City & County of Honolulu, Dept. of Design & Construction for further action.

City and Garden administration have not yet decided how the entrance into the parking lot will be controlled. Entry into the current parking lot is not consistently monitored and has resulted in parking conflicts. Some of the arrangements that have been suggested include a manned kiosk at the entrance to the parking area where parking fees would be collected prior to parking and then refunded at the Cashier when a ticket to the Garden is purchased, or an unmanned ticket spitter at the entrance with a manned kiosk at the exit collecting parking fees or validated visitor tickets for reduced or free parking. Both arrangements would help the City control the use of the parking lot by providing Garden visitors either free or reduced parking fees but also allowing others to park at the Garden at a higher cost when spaces are available.

LYON ORCHID CONSERVATORY AND GARDEN

In honor of Dr. Harold Lyon, the Lyon Orchid Conservatory is planned as a 10,000 square-foot facility honoring Foster Botanical Garden's first director, his dedication, his works, and his love of orchids. Unlike the existing Lyon Orchid Garden, the Conservatory will combine propagation facilities with display areas. The Conservatory will be a sunny yet enclosed structure to protect the delicate plants from predators, particularly the bulbul bird, airborne disease, and theft while the surrounding garden area, gazebo, and courtyards allow visitors to enjoy special displays and demonstrations outdoors. The Conservatory structure will be located *mauka* of the new parking lot and Kuan Yin Temple and can be built into the slope to minimize the view of the conservatory from the adjoining garden areas. If structurally sound and economically feasible, the existing Gift Shop structure could be renovated to serve as additional propagation space or as an adjunct classroom for the popular orchid classes and demonstrations held at the Garden.

Figure 14: Daibutsu Terrace

GARDEN AREAS

Many garden areas within Foster Botanical Garden have become legendary. For example, the Upper Terrace has wonderful vistas with its open lawn and majestic trees *(Figure 9)*; the Daibutsu Terrace is a tranquil space with dappled light falling onto the Daibutsu and under-

story plants and *(Figure 14)*; and the Prehistoric Glen with its array of coal-age plants has won the Founders Club Award from the Garden Club of America. All of these garden areas as well as the Palm Garden and Middle Terraces are largely left unchanged in this Master Plan. In general, the only improvements specified for these areas relate to circulation, informational displays, and infrastructure. Specific improvements involving plant material are best left to the Garden staff and specialists such as interpretive botanists and landscape architects hired by the City & County for the subsequent stages of design and construction for these areas.

New Garden Areas

The Master Plan introduces a few new concepts for additional garden areas. These include the Entrance Garden, Asian Garden, Bonsai Garden, and Native Hawaiian Garden. In addition, a condensed Economic Garden is proposed as well as a Rotating Display Garden which will showcase a variety of botanical displays that change over time.

Entrance Garden. Located along Vineyard Boulevard near the corner of Nu'uanu Avenue, the Entrance Garden acts as the foyer to the main Garden. This garden area should be selectively cleared of dense plantings along the two streets and large expanses of lawn will open up the area, highlighting the Exceptional Cupang Tree and Monkeypod Tree and pathways will lead visitors towards the Visitor Center. Any plant masses planned for this area should be colorful and remain relatively low so that views into the Garden from Vineyard Boulevard and Nu'uanu Avenue are preserved. The Entrance Garden will be open to the public during regular hours of operation, allowing people to relax or picnic on the lawn without having to pay the entrance fee.

Asian Garden. The Asian Garden will be developed in the area fronting the Kuan Yin Temple, taking advantage of its architecture and the existing bombax and crepe myrtle trees that are seasonally covered with flowers. In addition, plant species native to Japan, China, and Korea and suitable to our tropical climate will be highlighted here. Scenic pathways, informational displays, and comfortable seating areas should also be incorporated into the design of this garden area.

The Asian Garden could also be the new home for two existing garden monuments, the Fukuoka Yame Lantern and Hiroshima Monument. These monuments are gifts that were generously bestowed upon the City & County of Honolulu by the two respective cities in Japan. They are currently located at Foster Botanical Garden but are not readily noticeable by visitors. Properly staged, these monuments will add to the scenic beauty of the Asian Garden.

The Dr. Sun Yat-Sen Hawaii Foundation has approached the City regarding the placement of a memorial honoring Dr. Sun in the Asian Garden. City representatives and the Foundation have reached a tentative agreement that would incorporate the concept of a Dr. Sun Yat-Sen memorial garden within the Asian Garden. Conceptually, the memorial garden would utilize stones from China inscribed with quotes from Dr. Sun. The final design and location of the memorial garden, however, should be integrated into the overall design of the Asian Garden and neighboring Bonsai Garden. Final review by the City as well as City Council approval will be required before the Foundation's proposed memorial can be implemented.

Figure 15: Black Pine Bonsai on Display at Elandan Garden in Bremerton, WA

Bonsai Garden. Despite the local popularity of bonsai, there are no permanent bonsai displays in Hawai'i. There are several permanent displays in Japan, China, the Philippines, India, Belgium, as well as in the U.S. in California, Florida, Ohio, Washington, and Pennsylvania. However, there are none in Hawai'i. At the community meetings, local bonsai enthusiasts urged the creation of a permanent display at Foster Botanical Garden to fill this gap and to help boost visitorship. Drawing upon their knowledge and insight, the bonsai display is envisioned as an outdoor area where the plants may receive full sun and be experienced within a larger landscaped context. There are a variety of open-air examples to explore such as those within a natural setting (*Figure 15*) or within a formal garden with walls and pedestals (*Figure 16*). The Bonsai Garden is located on the master plan near the Asian Garden for a cultural context. The final design of the Bonsai Garden should incorporate input from local bonsai clubs and organizations.[8]

Courtesy of Jane Yamashiroya, Hawaii Bonsai Association

Figure 16: Bonsai Display Garden Golden State Bonsai Federation Collection North at the Lake Merit Garden Center, Oakland, CA

Native Hawaiian Garden. With the orchid display moved to the Lyon

[8] A partial list of local bonsai organizations is included in the "Other Design " section of this report.

Orchid Conservatory and Garden, the vacated area will be transformed into a native Hawaiian garden. The garden will provide an introduction to native Hawaiian plants with the existing Friends of Honolulu Botanical Garden Office renovated into an Ethnobotanical Center where interpretive and educational displays will be shown. Should the link under the H-1 Freeway to Lili'uokalani Botanical Garden be developed, visitors interested in seeing more native Hawaiian plants will be able to walk directly to Lili'uokalani Botanical Garden, the botanical garden devoted to native Hawaiian plants. During the detailed design phase, the City should consider reusing the existing rocks and larger trees in the area where possible.

Rotating Display Garden. Because of its visibility, the new garden area near the corner of Nu'uanu Avenue and Vineyard Boulevard has the potential to capture the public's attention and draw people into the Garden. It is the ideal location to showcase special botanical displays and events. Limited only by the staff's imagination, an assortment of interactive displays such as a Fragrance Garden, Evening Garden, Children's Garden, Braille Garden, Art Garden, or specialized floral collections could be featured here. Within the garden there is an open area tucked into the bend of the pathway roughly 70 feet wide by 50 feet deep that could be developed into an outdoor performance/demonstration area for special events.

Nu`uanu Stream Edge. In the 1970s, the area along Nu'uanu Stream was originally conceptualized as the Nu'uanu Stream Parkway by Oberlander Bush and Cave. This land was envisioned to be a continuous public greenway connecting mauka areas of the stream with the ocean. Remnants of this vision still exists in current planning documents such as the City's Public Facilities Plan and the current Review Draft of the Primary Urban Core Development Plan. However, the existing roadway configuration and traffic signalization in the area limits the feasibility of implementing the parkway on the Foster Botanical Garden side of the stream. In addition, the existing River Street Promenade on the opposite side of the stream offers a more logical connection to the City's current improvement plans for College Mall Walk and Sun Yat-Sen Mall and is closer to the existing signalized crosswalk.

Figure 17: View of Nu'uanu Stream Adjacent to Foster Botanical Garden

As a result, the area adjacent to Nu'uanu Stream on Foster Botanical Garden property will be recaptured for general visitor use. No longer hemmed in by a parking lot, the scenic edge along Nu'uanu Stream will have meandering pathways allowing visitors to leisurely stroll along the stream and enjoy the view. The existing trees and vegetation, some of which cascade gracefully over the stone wall along Nu'uanu Stream (*Figure 17*), provide wonderful opportunities to create shaded seating areas near the proposed Bonsai and Community Gardens as well as providing striking photographic backdrops. Although the wider pathways would be shared with service vehicles traveling to and from the maintenance facilities, pedestrian-vehicle conflicts should be minimal since the staff would be using these pathways typically when the Garden is not open to the public (early morning and late afternoons). The only vehicles that will be using the paths regularly when visitors are present would be the smaller maintenance Cushmans traveling intermittently to and from the Service Area.

Community Garden

In the new master plan, the Lyon Orchid Conservatory and Garden will displace the existing Foster Community Garden. The new location of the community garden will be the area above the proposed Bonsai Garden and near the Service Area. The majority of the plots will be handicap accessible, built over areas reclaimed from the existing parking lot. However, some of the upper plots will be built into the slope. Care should be taken during design to minimize cut and fill required during construction and to moderate the incline and to reduce or eliminate the number of stairs required to reach the upper plots to ease access for gardeners. In addition, the relocated community garden should incorporate into its design the two existing *Pritchardia hillebrandii* palms commonly known as Loulu lelo. These two specimens were originally planted at Queen's Hospital and relocated to Foster Botanical Garden during the hospital's recent renovation.

SERVICE AREA AND MAINTENANCE FACILITIES

Tucked into an underutilized portion of Foster Botanical Garden, the new Service Area will be the headquarters for all maintenance operations. The area will contain the operations & maintenance building, mist house, quarantine house, generic greenhouses, and staff parking. The architectural program for this area is presented in Table 5.

The structures may be built into the existing slope. A ten-foot grade difference between the Service Area and the main garden areas as well as dense planting buffers will help block the facilities from view. The Service Area will be enclosed and secured by fencing and accessed by gates located on both the *makai* and *mauka* ends of the area.

Table 5: Proposed Architectural Program for the Service Area

Program Space	Area (sq. feet)
Operations & Maintenance Building	
Operations Office	600
Shower and Locker Rooms	500
Maintenance and Storage Space	1,000
Covered Storage and Garage	1,500
TOTAL AREA	**3,600**
Other Structures and Program Space	
Quarantine House	400
Mist House	800
Greenhouses	1,600
Open Storage	~10,000

The Operations Office will house the Garden Supervisor and his/her staff. Separate locker rooms and shower facilities for men and women are required due to the use of herbicides and pesticides. Ample storage space is necessary for the equipment used during the Garden's special events such as the Annual Plant Sale and any other anticipated events. In addition, the Garden must have covered garage space to protect their mowers and other heavy equipment. The covered garage is designed much like a carport so that the staff can drive the mowers and trucks directly into the garage (*Figure 10*). The open storage areas will be used to stockpile garden materials and soil amendments such as mulch and compost.

Because only minimal propagation facilities is specified onsite, additional nursery space will be required at one of the City & County's other offsite propagation facilities to support the Garden. The City's Nu'uanu Facility on the Pali Highway has been suggested as the primary support facility.

Twenty-two parking stalls have been provided in the Service Area parking lot. The Garden currently requires parking for the three trucks, two cars, and five utility vehicles owned by the City & County of Honolulu. In addition, the staff requires at least eight employee parking stalls. It is expected that with the increase in Garden activity and intensity of garden development, additional staff and volunteers will be required. As a result, four additional stalls have been provided. The former main entrance to the Garden on Vineyard Boulevard near the Kuan Yin Temple will be closed to the public and converted into a service only driveway. The service gate on Nu'uanu Avenue will be maintained as a secondary access point for use only in emergencies and during special events.

CIRCULATION

The system of pathways as shown in the Master Plan builds off the existing curvilinear spine that connects the Cashier with the Friends of HBG Office and the administrative and maintenance buildings near Vineyard Boulevard. The new garden pathways will connect all garden areas in convenient loops so that visitors may travel to and through each of these areas without having to retrace their steps. The Interpretive Plan, as described below, should guide the progression of displays and visitor information presented along pathways. The main loops, which are indicated by the wider paths, will be shared with maintenance vehicles and should be a minimum of ten feet wide. In addition, they should be paved with colored concrete or similarly firm yet decorative materials. Care must be taken, however, to ensure accessibility standards are maintained along the main paths so that all visitors regardless of physical ability are able to travel throughout the entire Garden.

As noted earlier, a connection to Lili'uokalani Botanical Garden from Foster Botanical Garden under the H-1 Freeway has been explored on previous occasions. In concept, it would benefit both visitors and staff alike to have this direct link. However, in order for this link to be made, cooperation with the State of Hawai'i will be required since the passage would cross the freeway, a State right-of-way. In addition, the City needs to further explore safety, liability, cost, and flood considerations before the link can be pursued in more detail.

INTERPRETIVE PLAN, DISPLAYS, AND SIGNAGE

An Interpretive Plan will be completed to integrate the built elements of the master plan with an enhanced visitor experience. This plan will specify educational themes, visitor messages, and physical design tools that will help present the Garden and visitor facilities in an enjoyable and memorable context. An interpretive site plan will be developed to provide a road map for the effective use of visitor communication systems such as maps, informational kiosks, interactive exhibits, educational displays, and directional and safety signage. These systems will work cohesively to promote visitor understanding and appreciation of the valuable and historic plant collections. In addition to interpretive concepts and media methods, the plan will provide design and construction costs and a phasing plan that corresponds to the overall master plan.

NOISE WALL AND BUFFER

To reduce the noise and shield the views of the H-1 Freeway, an eight-foot tall wall and planting buffer are recommended. The wall and planting buffer should run the entire length of the Garden on its *mauka* edge minimizing the amount of traffic noise carried through the Upper Terrace and Palm Garden. Depending upon the budget and

materials chosen for the wall, the density of the plants can either soften the look of the wall or enhance it. With a rock wall, the plants may not need to be so dense. However, with a flat CMU wall or something similar, a denser plant buffer may be desired.

PERIMETER FENCING

The perimeter fencing for the Garden is envisioned to be a low rock wall with an open fence above to allow views into the Garden as well as provide security. Wrought iron or other lattice fencing that "disappears" from a distance could be used. All gates and entrances must be lockable so the Garden can be secured when closed to the public.

LIGHTING, IRRIGATION, AND UTILITIES

A longstanding wish of the Garden staff and administration is to improve the quality of special events held at Foster Botanical Garden after the sun has set. Historically for the Garden to host such events, large, noisy generators had to be placed throughout the Garden to power lights and sound systems. The Master Plan calls for lighting to be provided in key areas at the Garden particularly around the Visitor Center and along major pathways. Lighting design should be integrated with the garden amenities, kiosks, and botanical displays and should take care not to cause glare upon neighboring properties or streets. In addition, electrical outlets and hookups will be needed throughout the Garden so that electrical equipment brought into the Garden for special events may be powered.

As noted earlier, the Garden currently has water lines running throughout the developed garden areas. The staff must manually attach sprinkler heads, turn valves, and sometimes use hoses to irrigate the Garden. Precious staff time is inefficiently spent watering the grounds. A completely redesigned and reconstructed automatic irrigation system is needed at the Garden. New irrigation mains with state-of-the-art moisture and wind sensors can reduce the time spent by staff watering the Garden and may increase water and energy efficiency. Detailed design of the system should be developed with input from Garden staff.

To support the proposed lighting and irrigation systems as well as the new facilities, the City will need to assess overall the ability of existing infrastructure to support full build-out of the master plan early in the design and construction process. These include electrical, water, sewer, and telecommunications (including Internet connection). Based on input from the staff, existing connections and lines may require upgrading and rerouting. If needed, these improvements should be routed and constructed with input from botanical experts who can help position the lines with minimal harm to the significant plants at the Garden. Directional boring techniques and other suitable construction methods should be considered for these projects.

ACCESSIBILITY

Given the relatively flat topography of Foster Botanical Garden, all garden pathways and facilities will meet accessibility standards as required by Title II of the Americans with Disability Act (1990). Also, the proposed facilities and pathways will comply with appropriate administrative rules of the State of Hawai'i Disability and Communication Access Board (HAR Title 11 §216-219). Accessible areas or elements will be indicated throughout the Garden with appropriate signs and markers. Garden areas and paths, which for the sake of historical preservation, aesthetics, or sensitive plant material, are not fully accessible, will have signs or textured pavements to warn visitors of any potential hazards and/or physical barriers. Picnic tables, water fountains, and other amenities also will be fully accessible.

IMPLEMENTATION

To bring the Master Plan to fruition, construction phasing and budgeting must be considered. The following section describes a phasing plan that will allow the Garden to function with minimal disruption to regular visitor operations and related cost estimates. Phases were based on logical ordering of construction projects as well as breaking down the estimated cost into roughly equal amounts.

PHASING AND COST ESTIMATES

The Master Plan for Foster Botanical Garden recommends development of the proposed facilities in four phases. (*Figure 18*) Phases are not tied to any specific length of time and can be either condensed or extended over time depending upon available funds. Overall cost estimates for each phase are provided below. A detailed breakdown of these estimates is listed in Appendix C.

Phase I involves the relocation of the maintenance and nursery facilities to the currently underutilized *mauka* corner of the property near Nu'uanu Stream. The Service Area is done first so that the area along Vineyard Boulevard can be cleared and made ready for subsequent phases. In addition to the new Service Area, the landmark gateway element at the corner of Vineyard Boulevard and Nu'uanu Avenue will be developed to announce the changes happening at the Garden. Also, the construction of the noise wall and the redevelopment of the Lyon Orchid Garden into the Native Hawaiian Garden will occur during Phase I. Total construction cost for Phase I is estimated at $2.12 million and planning, design and engineering is estimated at $200,000.

The Lyon Orchid Conservatory and Gardens will be the focus of Phase II construction projects. The main structure, courtyard, and gazebo, related pathways, and the Orchid Classroom renovation will be completed. In addition, the visitor parking lot will be built with perimeter fencing and the main entrance gate at Maunakea Street. Alterations to the Vineyard/Maunakea intersection and development of the Asian Garden will also be completed during this phase. Simultaneous to construction activities, the Interpretive Plan will be done. Total construction cost for Phase II is estimated at $3.50 million and planning, design and engineering is estimated at $400,000.

The bulk of Phase III activities will center on the design and construction of the new Visitor Center. In addition, implementation of the Interpretive Plan and development of the Entrance Garden will be completed. The total construction cost for Phase III is

estimated at $3.60 million and planning, design and engineering is estimated at $360,000.

Throughout the first three phases, the existing parking lot and Cashier will continue to function as the main point of entry for visitors. In Phase IV, the parking lot will be reclaimed and redeveloped into the Bonsai and Community Gardens. Other elements of Phase IV include the remaining pathways and interpretive displays, the redevelopment of the Economic Garden and new Rotating Display Garden as well as the lighting, irrigation and garden amenities. Total construction cost for Phase IV is estimated at $3.6 million and design and engineering is estimated at $360,000.

Depending on the availability of City and County funding, the phasing may be modified to incrementally implement the Master Plan.

OTHER DESIGN ISSUES

With the completion and acceptance of the Master Plan and Environmental Assessment, Foster Botanical Garden will move into the implementation phase which involves detailed design and construction of the various elements as described above. The design professionals contracted to do the work should consult Garden staff at every level at a very early stage in the design process. In addition, various interest groups have requested participation in the design process. Although not typically involved in the design phase of projects, the interest groups with their years of experience and depth of knowledge can be a valuable resource for architects and other designers hired for specific elements of the master plan. A list of the garden clubs and organizations that were contacted or involved in the Master Plan process is provided below. This list is not meant to be comprehensive, but a starting point. The organizations are listed alphabetically.

- Foster Community Gardeners
- Friends of Honolulu Botanical Gardens
- Garden Club of Honolulu
- Hawaii Bonsai Association
- Hawaiian Botanical Society
- Honolulu Orchid Society
- Ikebana International
- Kaulunani Urban Forestry Program
- Landscape Industry Council of Hawaii
- Malama Hawaii
- Scenic Hawaii
- Suiyobi Bonsai Association
- The Outdoor Circle

- Waimea Arboretum
- Youth for Environmental Service

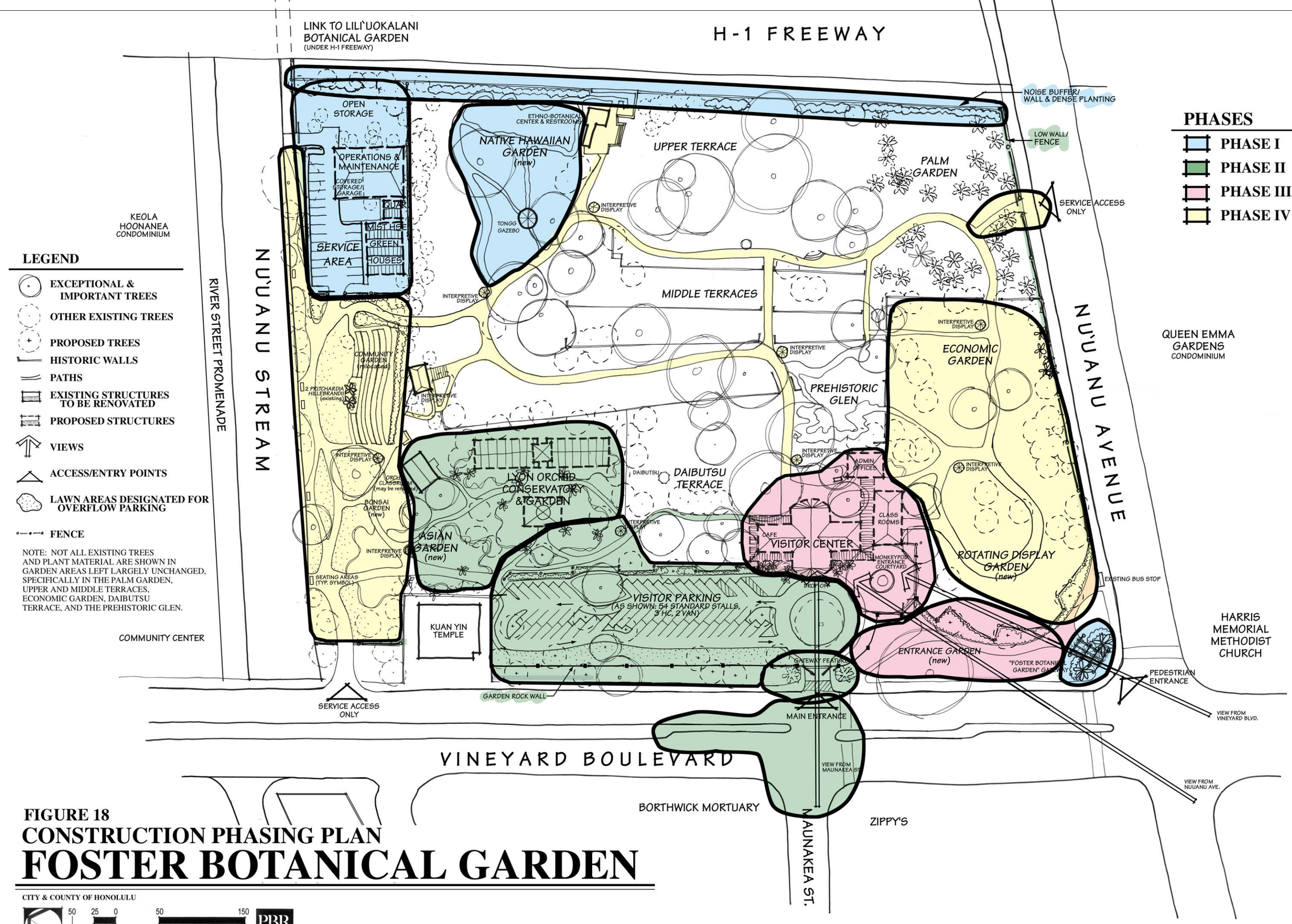

FIGURE 18

CONSTRUCTION PHASING PLAN

FOSTER BOTANICAL GARDEN

CITY & COUNTY OF HONOLULU

REFERENCES AND SOURCES

Bishop, Luther Earl (1973). *Honolulu Botanic Gardens Inventory 1972.* Honolulu: Friends of Foster Garden Press.

City & County of Honolulu, Department of Parks & Recreation. "Honolulu Botanical Gardens." Website: http://www.co.honolulu.hi.us/parks/hbg/hbg.htm.

City & County of Honolulu, Department of Planning & Permitting (July 1999) *Primary Urban Center Development Plan: Public review draft*. Honolulu: Author.

City & County of Honolulu, Department of Planning & Permitting (formerly the Department of Land Utilization) (June 1995) *Punchbowl Special District Design Guidelines*. Honolulu: Author.

City & County of Honolulu, Department of Planning & Permitting, Honolulu Land Information System. GIS Data Files. Website: http://www.co.honolulu.hi.us/planning/gis/index.htm.

Elandan Gardens website. http://elandangardens.8m.com/index.html. Tree098a.

Giambelluca, Thomas W., Nullet, Michael A., Schroeder, Thomas A. (1986). *Rainfall Atlas of Hawai'i*. Honolulu: State of Hawai'i Department of Land and Natural Resources Division of Water and Land Development.

Hackler, Rhoda E.A. (1986). *Foster Botanic Garden: A history of Foster Park and Garden and Lili'uokalani Garden*. Prepared for the Friends of Foster Garden.

Hubbard, James C. (August 16, 1989). *A Master Plan for Foster Garden: A general guide for refurbishing Honolulu's historic treasure during its 2nd century of existence.* Prepared for the City and County of Honolulu.

MacDonald, Gordon Andrew, Abbott, Agatin T., Peterson, Frank L. (1983). *Volcanoes in the Sea: The geology of Hawaii*. Honolulu: University of Hawai'i Press.

Oberlander, Bush, and Cave (1972). *A Preliminary Plan for Nuuanu Stream Parkway.* Prepared for the City and County of Honolulu Department of Parks and Recreation.

Neal, Marie (1965). *In Gardens of Hawaii*. Honolulu, Bishop Museum Press.

Rauch, Fred D. and Paul R. Weissich (2000). *Plants for Tropical Landscapes: A gardener's guide*. Honolulu: University of Hawai'i Press.

State of Hawai'i, Department of Business, Economic Development, and Tourism. GIS Data Files. Website: http://www.hawaii.gov/dbedt/gis/

State of Hawai'i, Department of Business, Economic Development, and Tourism (1996). *The State of Hawai'i Data Book*. Honolulu: Author. Website: http://www.hawaii.gov/dbedt/db96/index.html

State of Hawai'i, Department of Business, Economic Development, and Tourism (1998). *The State of Hawai'i Data Book*. Honolulu: Author. Website: http://www.hawaii.gov/dbedt/db98/index.html

State of Hawai'i, Department of Business, Economic Development, and Tourism (1999 Preliminary). *The State of Hawai'i Data Book*. Honolulu: Author. Website: http://www.hawaii.gov/dbedt/db99/index.html.

Unites States Department of Agriculture Soil Conservation Service (1972). *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. Washington D.C.: Author.

United States National Weather Service. "Honolulu Weather Data and Products." Website: http://www.nws.noaa.gov/pr/hnl/index.shtml.

University of Hawai'i Department of Geography (1983). *Atlas of Hawaii*. Second Edition. Honolulu: University of Hawai'i Press.

Wilson Okamoto & Associates, Inc. (April 5, 2001). Letter report "Foster Botanical Garden Traffic Impact Assessment."

Photographs from the Golden State Bonsai Federation Bonsai Display Garden Collection North at the Lake Merit Garden Center in Oakland, CA courtesy of Ms. Jane Yamashiroya, President, Hawaii Bonsai Association.

Telephone interviews with the staff at the Contemporary Museum and the Honolulu Academy of Arts.

APPENDIX A

The descriptions provided below were taken from the Foster Botanical Garden Self-Guided Tour Brochure (Revised 8/99 version) and supplemented with information from Hackler 1986 and HBG staff.

EXCEPTIONAL TREES

Exceptional trees are listed alphabetically by their common names. Scientific names included in parentheses. The decade or year in which the tree was accessioned is included when known.

Baobab ***(Adansonia digitata)*** – 1930s. In dry parts of Central Africa the Baobab tree is prized for its many products: mucilage, gum, fiber for rope, paper and cloth. Bark and oil from the seeds have medicinal properties. In some parts of Africa the trees are worshipped by the natives who bury their dead in the oversized trunks. Old hollow trunks are sometimes used as houses, prisons and water reservoirs.

Bo Tree ***(Ficus religiousa)*** – 1910s. This is the sacred tree of the Buddhists. The Bo Tree at Anuradhapura, Sri Lanka is believed to be the tree under which Gautama Buddha received enlightenment and is probably the oldest historical tree in the world. According to some historical references, the specimen at Foster Botanical Garden dates back to the 1910s is said to be a propagule of that historical tree, a gift to Mary Foster from Dharmapala, leader of the Buddhism revival in Ceylon, in return for her generous support. Another story regarding the Bo Tree at Foster Botanical Garden involves Dr. Hillebrand. In this account, Dr. Hillebrand is said to have brought back a cutting from a Bo tree in Ceylon which had grown from a cutting from the original Bo tree 1,000 years earlier and established it in his garden in the 1860s.

Caribbean Royal Palm ***(Roystonea oleracea)*** – 1880s. The Caribbean Royal Palm is native to the Barbados and nearby islands. The central immature leaves, "Heart of Palm", are harvested and may be found canned in specialty shops and are considered a delicacy.

Cannonball Tree ***(Couroupita guianesis)*** – 1930s. This member of the Brazil nut family is native to Guiana. Note that the flowers are borne only on special stems on the main trunk. The heavy spherical fruit gives rise to the common name.

Chaulmoogra ***(Hydnocarpus anthelmintica)*** – 1920s. An oil expressed from this Burmese tree was used in the treatment of leprosy and other skin afflictions. This specimen came from Dr. Joseph Rock's collection.

Chicle ***(Manilkara zapota)*** – 1900s. The sap of this tropical Mexican tree is the source of commercial chicle, the principal ingredient of chewing gum. The fruit (sapodilla) is edible and delicious. The wood is tough and prized for carving. Some Mayan ruins have well-preserved carved lintels of the wood.

Cupang ***(Parkia javanica)*** – 1920s. This grand tree, with fern-like leaves, may grow from 60 to more than 100 feet high. In Malaysia the black, hanging pods are roasted and eaten or used medicinally.

Doum Palm ***(Hyphaene thebaica)*** – 1910s. The Doum Palm originated in the Egyptian Sudan and belongs to the only genus of palms with a branching habit. The fruit is edible, giving rise to another name, "Gingerbread Palm." The magnificent doum palm at Foster Botanical Garden once belonged to Dr. Rock's collection.

Earpod ***(Enterolobium cyclocarpum)*** – 1850s. The Earpod is at home in Tropical America. It may become 125 feet high and have a trunk 10 feet in diameter. Shiny, brown, ear-shaped seedpods give the tree its common name. It is a useful timber tree.

False Olive ***(Cassine orientalis)*** – 1850s. This shrub or small tree from Madagascar and Mauritius is grown for its handsome leaves. The fruit looks like a small olive with one or two seeds and the flowers are yellow-green in color.

Giant Crape Myrtle ***(Lagerstroemia speciosa)*** – 1880s. The Giant Crape Myrtle tree, native from India to Australia, is valued for its pink to purple flowers. This tree also has durable timber and medicine can be extracted from the bark.

Gigasiphon Macrosiphon – Native to tropical East Africa, this medium-size tree is a highly endangered species and possibly extinct in the wild. The large white flowers open early in the evening.

Guana ***(Lonchocarpus domingensis)*** – 1880s. In their native areas of Central America and West Indies, these trees are used to shield coffee and cocoa trees from sun and wind.

Hog Plum ***(Spondias mombin)*** – 1850s. In early autumn the ground below this tree is covered with yellow plum-like fruit which can be eaten raw or made into preserves. It is related to the mango and cashew nut.

Hoop Pine ***(Araucaria cunninghamii)*** – 1850s. The Hoop Pine tree, native to eastern Australia, is named for its horizontally banded bark. This valuable lumber tree may attain a height of 200 feet and a diameter of six feet.

Kapok ***(Ceiba pentandra)*** – 1850s. The most important product of this useful tree is the floss encased within its seedpods. This floss consists of hollow, waterproof filaments and is used for stuffing life preservers, pillows, mattresses and upholstery. The largest supply comes from Java and the Philippines and some from Mexico.

Loulu ***(Pritchardia lowreyana)*** – 1850s. Surprisingly, Pritchardias are the only genus of palms native to Hawai'i. Nineteen species are found throughout the islands ranging from sea level to 4,000 feet in elevation. A unique species may be confined to one valley on a single island. This *Pritchardia lowreyana* specimen is over 100 years old.

Pili Nut ***(Canarium vulgare)*** – 1880s. Native to Malaysia, the Pili Nut tree has a gray bark containing an aromatic resin. The fruits are somewhat three-sided nuts which are edible, have an almond-like flavor and yield oil used for lights and cooking.

Pogada ***(Mimusops elengi)*** – 1880s. This large tree from India, Sri Lanka and Malaysia can reach 80 feet in height. It is valued for its wood to make furniture and boats and the bark contains tannic acid used for tanning.

Queensland Kauri ***(Agathis robusta)*** – 1850s. This handsome tree from Queensland, Australia, is a broad-leafed conifer. Its magnificent trunk furnishes strong, light lumber for general construction.

Quipo ***(Cavanillesia platanifolia)*** – 1930s. This giant relative of the Pink Bombax Tree produces masses of chartreuse, papery, winged pods. A rapid grower, the Quipo was planted in the early 1930s. In its native Panama the wood is used wherever a light, strong material is needed. It surpasses the famed Balsa Wood for its lightness and strength.

Sideroxylon obtusifolium – The tree has a milky sap, small white flowers and black fruits with edible pulp.

Tattele ***(Pterygota alata)*** – The Pterygota is from the tropical Brazilian Amazon. It is a rapid growing tree with a widespread canopy.

Tropical Almond ***(Terminalia catappa)*** – 1850s. The Tropical Almond from the East Indies is grown in many tropical countries for shade, ornament, timber and its almond-like fruit are used medicinally.

Yokewood Tree ***(Catalpa longissima)*** – 1920s. The Yokewood Tree is grown in Hawai'i ornamentally and for reforestation. The strong, hard wood is used in the West Indies for construction.

SIGNIFICANT TREES

Significant trees are listed alphabetically by their common names. Scientific names included in parentheses. The year or decade in which the tree was accessioned is included when known.

Bombax or Silk Cotton Tree (*Bombax ceiba*) – There are three magnificent bombax or silk cotton trees at Foster Botanical Garden. The two located in the Economic Garden (accession no. 64.2458W[9]) were propagated from seed collected near the Leron River in Lae, New Guinea by the J.S. Womersley Division of Botany in 1964. The other bombax is located in the existing parking lot near Nu'uanu Stream (accession no. 68.0149). This specimen was grown from seed collected by former director, Paul Weissich, in 1968 from a private garden in Penaque, Philippines (west of Manila along the bay front). Native to tropical Asia, the trees have spectacular large, edible red flowers that mature into fruits. These fruits are woody capsules containing seeds covered by white floss (also called "cotton or kapok"). The floss aids in seed dispersal but is considered commercially inferior to true kapoks, *Ceiba pentandra*, two of which are located on the Upper Terrace and are designated as ETs. The trees have buttressed root systems and the timber is used for matches and canoes.

Calabash Nutmeg *(Monodora myristica)* – This large tree of West Tropical Africa yields a hard wood used in general carpentry. Flowers are decorative and fragrant. The aromatic seeds have an odor and flavor considered to resemble that of nutmeg. When roasted and ground, the seeds serve important medicinal uses. This specimen was planted in honor of Dr. Lyon as a living memorial on the one-year anniversary of his death. The inscription on the bronze plaque near the tree reads, "[The *Monodora myristica*] was imported as number 9670 representing at his death on May 15, 1957 the number of new plants he had introduced into Hawaii from other parts of the world."

Chinese Banyan *(Ficus microcarpa)* – 1900s. Originating in Southern Asia and Malaya, this is one of the most commonly seen trees in Hawai'i. It has slender hanging roots which may become trunk-like. Leaves and bark have medicinal properties; in tropical China, the aerial roots are made into a cure for toothache.

Cigar Box *(Cedrela odorata)* – 1920s. Timber from the Cigar Box is light in weight, strong and pleasantly aromatic. As the name implies, it is used to make cigar boxes among many other constructive uses throughout its native area from the West Indies south to the Amazon. The tree, when in flower, is the subject of considerable attention due to the highly unpleasant odor of the flowers.

[9] The "W" denotes that the seeds were wild collected, which is preferred in plant collections.

Double Coconut ***(Lodoicea maldivica)*** – 1930s. This rare palm bears the largest and heaviest seed of any plant, a single nut weighing up to 50 pounds. The fruit requires 10 years to ripen. Before they were discovered growing on the Seychelles Islands it was believed that the large nuts seen floating in the Indian Ocean came from a mysterious submerged tree. Sailors gave them the name "Coco de Mer."

Gold Tree ***(Tabebuia donnell-smithii)*** – 1969. A magnificent tree reaching heights up to 75 feet, the Gold Tree has a slender, smooth, gray trunk. When in bloom, masses of yellow crape-like flowers cover the canopy. The deciduous tree originates from Mexico and Central America and its wood sometimes used for veneering and cabinetwork.

Mindanao Gum ***(Eucalyptus deglupta)*** – A forest giant attaining 200 feet in height, this useful timber tree originates from the heavy rainfall areas of Mindanao in the Philippines and from New Guinea, New Britain, New Ireland, and the Celebes. Our trees are from New Guinea. In the Philippines only limited logging is permitted; major stands on the island of Mindanao are under government protection.

Monkeypod ***(Samanea saman)*** – A favorite shade tree in Hawai'i, the monkeypod tree originiates from tropical America. Near water, it can reach 80 feet in height and has an amazing dome-like canopy. The wood is tough, streaked in light and dark colors, and is frequently used for handmade platters, bowls, and other woodcrafts. Leis can be made from the seeds. The name, monkeypod, comes from the Greek word "pithecellobium," which means monkey and earring, referring to the twisted pods of another tree, the opiuma. The exact age of the specimen at Foster Botanical Garden dates is unknown, but it is believed to have shaded the "backyard" of the old Japanese School that once existed where the Economic Garden now stands.

Rainbow Shower ***(Cassia x nealiae 'Wilhelmina Tenney')*** – The rainbow shower is the official tree of Honolulu. 'Wilhelmina Tenney' hybrid is the result of a cross originally made around 1910-1917, between the pink-and-white and golden shower trees. Flower color ranges from a reddish-pink to golden yellow. The specimen located in the Daibutsu Terrace is the original parent tree.

Red Saraca ***(Saraca declinata)*** – Native to the forests of Southeast Asia, this species is usually found adorning the edges of streams with dark, fibrous roots trailing into the running water. This tree displays brilliant orange-red flower heads that measure nearly 6-inches across.

Samoan Puakenikeni (*Fagraea berteroana*) – 1964. This Samoan Puakenikeni was collected by former director Paul Weissich and Jim Hubbard in May 1964 and brought to Foster Botanical Garden where it has thrived. This specimen should be tree spaded and moved to an appropriate place in the Garden during the construction of the new

Visitor Parking Lot. The Director and Garden staff should be consulted for direction for this effort.

Sausage Tree ***(Kigelia Africana)*** – 1920s. This tree, native of tropical West Africa, is remarkable for its oblong, gray, gourd-like fruits ("sausages") suspended by long, cord-like stalks from three to five feet long. In Central Africa natives hold the tree sacred and the fruit is used in medicine but not eaten.

Silver Buttonwood ***(Conocarpus erecta var. Sericeus)*** – no. 8898. It is quite possible that the buttonwood tree at Foster Botanical Garden is the original specimen from which many, if not all other buttonwood trees in Hawai'i were propagated. The buttonwood is native to tropical America where it grows in mangrove swamps. It ranges from a prostrate shrub to a 60-foot tall tree. The one at the Garden is an amazing sprawling specimen that is a combination of the two with branches supported in places by cut logs.

Sterculia sp. – 1983. An unknown member of the Sterculia genus, this specimen was added to the Garden in 1983. It is approximately 60 feet tall with a buttress root system. It flowers in March/April and will often flower again in the fall. Flowers are showy, deep reddish-orange racemes visible from a distance. The flowers mature into orange-red fruits roughly 2-inches in diameter with glossy black seeds which can be used for ornamental purposes. The genus is named after Sterculius, the Latin God of "Privies," due to the foul flower odor of some species. The flowers of this specimen do not have a scent.

Travellers Tree ***(Ravenala madagascariensis)*** – 1880s. This exotic plant from The Malagasy Republic is a giant of the banana family. Legend says it derives its name from the potable water stored at the base of each leaf. It is said travelers tap this water to quench their thirst.

Tropic Coral ***(Erythrina variegata 'Tropic Coral')*** – no. F-1029. A native of Southeast Asia, the Tropic Coral tree is a tall, columnar tree often used as a windbreak or screen in Hawai'i. Reaching 50 feet in height, it has bright red-orange flowers that bloom in the spring. The specimen at Foster Botanical Garden is the original parent tree from which many tropic corals in Hawai'i have been propagated.

Wax Palm ***(Copernicia prunifera)*** – 1930s. The thick, grayish coating on the leaf of this palm furnishes a product called "Carnauba Wax," an important ingredient in fine furniture and floor polishes.

Yellow Shower Trees ***(Cassia fistula*** **and** ***Cassia x nealiae 'Lunalilo Yellow')*** – 1982 and 1983, respectively. The Cassia fistula originates from India and grows to 40 feet in

height. It has pendulant yellow flower clusters which bloom from March to September. It sets long, brown seedpods that have a strong odor. In Asia, the seed pulp is used medicinally and has been given the name "purging cassia." The Lunalilo Yellow variety, however, is a hybrid of the *C. fistula* and *C. javanica* species that was developed in Hawai'i. Lunalilo Yellow has sweetly fragrant flowers that open bright yellow orange and fade to a bright yellow. It is in bloom from late spring to early fall. The two trees at the Garden are prized as seed specimens.

MONUMENTS, SCULPTURES, AND MEMORIALS IN THE GARDEN

Memorial Benches – Donated by the Garden Club and designed by Vladimir Ossipoff, the two memorial benches honor Mrs. Alice Kimball, the first president of the Garden Club and wife of Alexander J. Campbell, and Mrs. Maude Fletcher Lyon, the wife of Dr. Harold L. Lyon. The benches are semicircular and constructed of volcanic rock and faced with redwood. The front area is paved with slabs of Hawaiian slate. They were officially presented on April 24, 1957 and presently sit at the edge of the Upper Terrace in view of the magnificent trees.

Hiroshima Monument – A contemporary granite sculpture commemorating the 75th anniversary of the arrival of the first Japanese immigrants was presented to the City of Honolulu by its sister city, Hiroshima, and Hiroshima Prefecture in 1960. The piece, in the shape of the letter "C" representing "Century," bears a perforation at its base indicating 75 years instead of 100. The slight twist when viewed from the side symbolizes permanent progress toward more unity and deeper friendship between Honolulu and Hiroshima and between America and Japan. On the sides of the supporting column are inscribed old Chinese characters meaning, "Peace and Harmony Invoke Blessings from Heaven."

Daibutsu – Cast in bronze, the figure is a reduced replica of the great Buddha of Kamakura cast in the 13th century. This national treasure of Japan is an immense figure 35 feet high, seated upon a pedestal of granite carved in the lotus motif, one of the symbols of the Buddha. The gift was presented to the City of Honolulu by the Governor of Kanagawa Prefecture, Japan, on June 16, 1968, marking the exact 100th anniversary of the arrival of the first immigrant to Hawai'i from Japan.

Fukuoka Yame Stone Lantern – The Lantern was presented to the City and County of Honolulu on November 9, 1973, by the Fukuoka Prefecture in Kyushu, Japan. The stone, a conglomerate of the Aso volcanic zone, is soft and readily carved when quarried but hardens upon exposure to the atmosphere. It has been the favored material in the Chikugo area since the early Tokugawa days for the making of lanterns, carved building details and other sculptural pieces. Yame stone is now prized

throughout Japan for its texture, light weight and ease of handling. The Lantern is currently located in the Daibutsu Terrace.

APPENDIX B

ISSUES, CONSTRAINTS, AND OPPORTUNITIES

The following notes identify various issues, constraints, and opportunities that have been voiced by Foster Botanical Garden staff and community members involved in previous and current master planning efforts. They range in topic from physical features to safety to daily maintenance and operations needs. The order in which they are presented is random and accords no weight or priority to those listed first.

Public Entrance and Visibility

- A theme that has carried through the different versions of the Master Plan is the expanded front yard along Vineyard Blvd. The fence line would be moved further back so that the area along Vineyard could be made more accessible and more public and improve visual recognition of the Garden. In response, Heidi Bornhorst raised safety concerns. She did not want to relinquish too much space since they have experienced problems with the homeless and with dangerous trash hidden in the vegetation along the Garden's borders.
- In the Sept. 20, 1997 Master Plan, an additional cut was made in the median along Vineyard Blvd. To accommodate the parking entrance. The Conceptual Master Plan proposed by the Friends of Honolulu Botanical Gardens located the parking entrance across from Maunakea St. Heidi Bornhorst agreed that this would be a more logical location since it would not change the traffic flow and they could piggy-back off the existing signal.
- Corner of Vineyard and Nu'uanu. This is an important corner that can help improve Foster's visibility. The 2 Orbignya palms could be kept and used as a visual marker or gateway. The design should be low maintenance.

Facilities and Maintenance

- The Garden needs classrooms / meeting rooms
- The Garden needs gift shop and cashier storage areas
- The Garden needs a better display space for a rotating display for bonsai, Ikebana, orchids, etc.
- It would help if all administrative functions were located under one roof. In this way, the staff could help support one another.
- It would be nice to have a Dickey-style roof on the structure.
- Evening lighting and other electrical needs. Would be nice to have outlets spaced throughout the Garden so that noisy generators are not needed for evening events.

- Adequate restroom facilities (particularly for women).
- Include a full-service restaurant with a top-notch chef and liquor license. The restaurant could be placed on the second floor of the proposed structure so that there is a view of the treetops for patrons.
- An expanded locker room for the staff is needed with separate showers for men and women.
- The Botany Office/Label Room is much too small and in extremely poor condition.
- The Garden needs an Orchid Nursery display, at the Lyon Orchid Garden
- The Garden needs Storage space for maintenance vehicles.
- Try to maintain the same paved footprint to avoid archaeological study.
- Some of the propagation facilities would need to remain at Foster, as opposed to moving to Hoʻomaluhia, since the climate at the two gardens are too dissimilar and would not be appropriate for plant cultivation.
- Preserve the tribute to Lyon in the Historical Lyon Orchid Garden. Its current location is problematic since the trees in the area are being damaged and there has been theft.
- In the Daibutsu Terrace and Economic Garden, except for the Exceptional Trees and some key trees, much of the vegetation is replaceable.
- The Economic Garden is underutilized. Visitors do not venture very far into the area most likely due to the lack of paved pathways. There are a few important trees that would need to be retained. However, it may be a possible location for the Lyon Orchid Garden.
- The area around the Hiroshima Monument is another alternative for the Lyon Orchid Garden. The area is insulated from traffic noise and there are shaded areas.

Safety

- Improved surveillance is needed.
- Heidi Bornhorst raised safety concerns. She did not want to relinquish too much space along the Vineyard Boulevard fence line since they have experienced problems with vandals and hazardous trash along the Garden's borders.

Circulation and Access

- Investigate the possibility of a pedestrian/maintenance truck link between Foster and Liliʻuokalani Botanical Gardens. Some issues that will need to be considered include: entrance fee at Foster but not at Liliʻuokalani, security, safety and liability issues due to its location in the stream channel.
- Convenient parking and access for maintenance vehicles. For truck access, a circular or loop layout would be preferable.

- Staff Parking. Heidi to get back to us on how many stalls are needed for staff. Currently there are 9 cars parked in front of the Horticulture Office with 4 in tandem.
- Visitors do not venture very far into the Economic Garden area most likely due to the lack of paved pathways
- A connection between the Palm Garden and the Economic Garden area is needed for both ADA requirements and maintenance vehicles. Also, a secured truck entry in this area from Nu'uanu may function well.
- Connection to Lili'uokalani Botanical Garden. There is an existing concrete ramp leading down from the NW corner of the Garden as well as a passageway under the H-1 Freeway and another ramp leading up to Lili'uokalani Botanical Garden. Heidi Bornhorst noted that a connection between Foster and Lili'uokalani would be ideal, particularly since the foundation for it under the freeway is already in place. There is a drainage outlet under the freeway that empties into Nu'uanu Stream, spilling water out across the potential connection. There also is a partially exposed sewer pipe along the *ewa* side of the passageway under the freeway.
- ADA requirements need to be addressed. Based on discussions with the State of Hawai'i Department of Health Disability and Communication Access Board, all architectural facilities will meet Title II requirements of the Americans with Disability Act (1990). However, because no standards for outdoor areas have been adopted by either federal or state agencies, the State Department of Health Disability and Communication Access Board recommends following the guidelines proposed by the Outdoor Developed Areas Regulatory Negotiation Committee in their Final Report, September 15, 1999 for the outdoor areas of the Botanical Garden.

OTHER ISSUES AND CONCERNS

- Community Garden. The community garden occupies prime space at Foster. If there is a possibility of relocating the community garden, this area may be another alternative location for the Lyon Orchid Garden. A discussion with community gardeners and the community gardens coordinator is needed to explore this issue and potential relocation sites.

APPENDIX C

DETAILED PHASING PLAN AND COST ESTIMATES

IMPROVEMENT	AMOUNT	UNITS	UNIT COST	TOTAL COST	P&E DESIGN
PHASE I IMPROVEMENTS					
Nu`uanu/Vineyard Gateway & Signage	5,000	SF	$15.00	$75,000.00	
Operations & Maintenance Building	3,600	SF	$150.00	$540,000.00	
Quarantine Greenhouse	400	SF	$125.00	$50,000.00	
Mist House	800	SF	$100.00	$80,000.00	
Greenhouses	1,600	SF	$100.00	$160,000.00	
Staff Parking Lot	22	STALLS	$6,000.00	$132,000.00	
Service Area Open Storage	5,000	SF	$3.00	$15,000.00	
Service Area Fencing	700	LF	$35.00	$24,500.00	
Garden Pathways/Service Access Road (10 ft. wide average)	6,000	SF	$10.00	$60,000.00	
Noise Wall (8 ft. high, linear feet)	820	LF	$250.00	$205,000.00	
Garden Area Renovation (former Lyon Orchid Garden)	35,600	SF	$8.00	$284,800.00	
Open Storage Area	10,000	SF	$5.00	$50,000.00	
Site Clearing & Tree Relocation	1	LS	$50,000.00	$50,000.00	
SUBTOTAL:				**$1,726,300.00**	
20% Contingency:				**$345,260.00**	
TOTAL:				**$2,071,560.00**	
SAY:				**$2,120,000.00**	**$200,000.00**
PHASE II IMPROVEMENTS					
Lyon Orchid Conservatory	10,000	SF	$160.00	$1,600,000.00	
Renovate Gift Shop (Orchid/Garden Classroom)	1,000	SF	$25.00	$25,000.00	
Garden Pathways (10 ft. wide, Orchid Garden & to Visitor Ctr)	4,100	SF	$10.00	$41,000.00	
Maunakea Street Entry Gate	1	LS	$125,000.00	$125,000.00	
Visitor Parking Lot	80	STALLS	$6,000.00	$480,000.00	
Parking Connection Road/Asian Garden Pathway (12 ft. wide)	2,160	SF	$10.00	$21,600.00	
Fencing along Vineyard (with low foundation wall)	850	LF	$75.00	$63,750.00	
Fencing along Nu`uanu Avenue (with low foundation wall)	600	LF	$75.00	$45,000.00	
Fencing along *mauka* edge of parking lot	500	LF	$35.00	$17,500.00	
Interpretive Plan	1	LS	$75,000.00		$75,000.00
Landscape improvements in front	7,000	SF	$5.00	$35,000.00	

IMPROVEMENT	AMOUNT	UNITS	UNIT COST	TOTAL COST	P&E DESIGN
of Parking Lot along Vineyard					
New Orchid & Asian Gardens	20,000	SF	$12.00	$240,000.00	
Demolition of 7 Structures	1	LS	$80,000.00	$80,000.00	
Site Clearing & Tree Relocation	1	LS	$50,000.00	$50,000.00	
Modify Maunakea Intersection/Traffic Light	1	LS	$100,000.00	$100,000.00	
SUBTOTAL:				**$2,923,850.00**	
20% Contingency:				**$584,770.00**	
TOTAL:				**$3,508,620.00**	
SAY:				**$3,500,000.00**	**$400,000.00**
PHASE III IMPROVEMENTS					
Visitor Center	10,000	SF	$250.00	$2,500,000.00	
Interpretive Displays/Signage	1	LS	$225,000.00	$225,000.00	
Monkey Pod Entrance Courtyard	6,300	SF	$15.00	$94,500.00	
New Entrance Garden	10,000	SF	$8.00	$80,000.00	
Garden Pathways (10 ft. wide, Entrance Garden)	4,200	SF	$10.00	$42,000.00	
Fencing along *mauka* edge of Entrance Garden	450	LF	$35.00	$15,750.00	
Demolition of 3 Structures	1	LS	$40,000.00	$40,000.00	
SUBTOTAL:				**$2,997,250.00**	
20% Contingency:				**$599,450.00**	
TOTAL:				**$3,596,700.00**	
SAY:				**$3,600,000.00**	**$360,000.00**
PHASE IV IMPROVEMENTS					
Demo Parking & New Bonsai/ Community Gardens	50,000	SF	$12.00	$600,000.00	
Garden Pathways (New Bonsai/ Community Gardens)	4,500	SF	$10.00	$45,000.00	
Garden Pathways (Economic/New Rotating Display Gardens)	7,800	SF	$10.00	$78,000.00	
Upper Pathways (10 ft. wide, Econ to old Cashier, thru Upper Terrace)	11,000	SF	$10.00	$110,000.00	
Garden Pathways (old Cashier to Visitor Center)	5,500	SF	$10.00	$55,000.00	
Service Road Connection (Nu`uanu Avenue)	7,000	SF	$10.00	$70,000.00	
Interpretive Displays/Signage	1	LS	$150,000.00	$150,000.00	
Garden Areas (Economic/New	80,000	SF	$8.00	$640,000.00	

IMPROVEMENT	AMOUNT	UNITS	UNIT COST	TOTAL COST	P&E DESIGN
Rotating Display)					
Renovate FHBG Office Bldg. (Ethnobotanical Center)	674	SF	$50.00	$33,700.00	
Renovate Cashier/Info Desk Bldg.	600	SF	$50.00	$30,000.00	
New Irrigation System	510,000	SF	$1.25	$637,500.00	
Lighting	1	LS	$150,000.00	$150,000.00	
Other Amenities (benches, etc.)	1	LS	$50,000.00	$50,000.00	
Underpass to Lili'uokalani BG (if feasible)	1	LS	$350,000.00	$350,000.00	
SUBTOTAL:				**$2,999,200.00**	
20% Contingency:				**$599,840.00**	
TOTAL:				**$3,599,040.00**	
SAY:				**$3,600,000.00**	**$360,000.00**